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Discovery of Self-Sustained ^{235}U Fission Causing Sunlight by Padmanabha Rao Effect

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Abstract : *For the first time in solar physics, this paper reports a comprehensive study how ^{235}Uranium fission causes Sunlight by the atomic phenomenon, Padmanabha Rao Effect against the theory of fusion. The first major breakthrough lies in identifying as many as 153 solar lines in the Bharat Radiation range from 12.87 to 31 nm reported by various researchers since 1960s. The Sunlight phenomenon is explained as follows. For example, the energy equivalence 72.48 eV of the most intense 17.107 nm emission in the middle of solar spectrum is the energy lost by β, γ, or X-ray energy of a fission product while passing through core-Coulomb space. This energy loss is the Bharat Radiation energy that cause EUV, UV, visible, and near infrared emissions on valence excitation. From vast data of emissions and energies of various fission products, 606.31 keV β ($E_{\beta max}$) energy of ^{131}I was chosen as the source of 17.107 nm emission. For the first time a typical Bharat Radiation spectrum was observed when plotted energy loss against β, γ, or X-ray energies of fission products supposedly present in solar flare and atmosphere : ^{113}Xe, ^{131}I, ^{137}Cs, ^{95}Zr, ^{144}Cs, ^{134}I, ^{140}Ba, ^{133}I, ^{140}La, ^{133}In etc that caused solar lines. Consistent presence of a sharp line for four months in AIA spectral EUV band at 335A exemplifies self-sustained uranium fission from a small site appeared in SDO/AIA image at 304A. Sun's dark spot is explained as a large crater formed on Sun's core surface as a result of fission reaction that does not show any emission since fission products would be thrown away from the site during fission. Purely the same Sun's core material left over at the site after fission reaction devoid of fission products and any emission seems to be the familiar dark Matter. This could be the first report on the existence of Sun's Dark Matter.*

Keywords: *X-ray, β, γ, Bharat Radiation, EUV, UV, visible light, near infrared, solar flare, Sunlight phenomenon, Padmanabha Rao effect, ^{235}U fission, SDO/AIA image of Sun, AIA spectral band, Dark Sun spots, Dark Matter, fission products, ^{131}I, ^{137}Cs, ^{133}Xe, ^{90}Sr, ^{90}Y, core-Coulomb space, valence excitation, 94A, 131A 171A,193A, 211A, 304A, 335A.*

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I. Introduction

The latest discovery on existence of Bharat Radiation wavelengths from 12.87 to 31 nm in solar spectrum has brought a fundamental change in the current understanding on Sunlight phenomenon [1]. The success has come when a wide range of mysterious wavelengths from 12.87 to 31 nm in solar spectra measured by various researchers since 1960s have been identified as Bharat Radiation wavelengths [2-5]. That is how solar spectrum provided the first evidence when a search was made on existence of Bharat Radiation emission predicted from radioisotopes and XRF sources [6-10, 12]. More importantly, the previous study has clarified that solar X-rays and extreme ultraviolet (EUV) are not independent emissions. The field of solar spectroscopy received a new impetus with the disclosure that the latest solar spectrum reported by Woods et al in 2011 constitutes three major wavelength ranges: X-ray up to 12.87 nm, Bharat Radiation from 12.87 to 31 nm, and EUV beyond 31 nm with reference to solar spectrum in Fig.1[1, 2]. These three successive wavelength ranges found in solar spectrum following the predicted pattern of a laboratory XRF source redefine the basic electromagnetic spectrum. Their successive positions holds the key that X-rays cause Bharat Radiation, in turn Bharat Radiation causes EUV, UV, visible, and near infrared radiation emissions by the atomic phenomenon, Padmanabha Rao Effect [8,11]. Conceptually, Sun's Bharat Radiation emission by β, γ, and X-ray energies of radioisotopes agreeing with the view that ^{235}U fission powers Sunlight against the widely believed fusion could be a major breakthrough in solar physics. This paper reports evidences on presence of fission products in solar flare and atmosphere. That is how an unprecedented success has come in identifying solar lines as many as 153 measured by various researchers since 1960s within 12.87 to 31 nm range of Bharat Radiation [2-5]. Furthermore, the current study provides the most plausible explanation how solar lines are produced by specific β, γ, and X-ray energies of uranium fission products by Padmanabha Rao Effect, with unprecedented detail.

Sunlight phenomenon being one of the most complex phenomena in science evaded from previous researchers. Understanding the phenomenon needed advanced knowledge in the fields of nuclear physics, X-ray physics, and atomic spectroscopy. A surprise finding, optical emission detected from Rb XRF source in 1988 led to the discovery of a previously unknown atomic phenomenon causing Bharat radiation emission followed by optical emission from radioisotopes and XRF sources reported in 2010 [10]. The same phenomenon was found causing the Sunlight. However, it took nearly 25 years of research to reach the current level of understanding the Sunlight phenomenon reported here.

The previous study was limited to identification of a broad range of Bharat Radiation wavelengths from 12.87 to 31 nm in the solar spectrum reported by Woods et al in 2011 reproduced in Fig.1 [1, 2]. It has prompted this exhaustive study, which provides a detailed explanation how solar lines in that range are actually produced. Fortunately, uranium fission taking place on Sun's core surface generates high temperatures as a by-product, while achieving such high temperatures by fusion remained a theoretical proposition. The concept of fusion faced major setback when most solar lines could not be identified on the basis of thermally excited atomic spectra. Only a limited few were traditionally believed to be Fe, He, Mg, and Ne lines as shown in Fig.1, yet complete disagreement was reported between solar lines and the latest measurement of Fe lines, say between solar 17.1073 nm emission and Fe IX emission [1]. Truly speaking, on valence excitation the Sun's Bharat Radiation generates a 'new class of atomic spectral line emissions' in EUV, UV, visible and near infrared range regardless of temperature from within the excited radioisotopic ions remaining in atomic state [10].

The most difficult task in the current study is the selection of a specific β, γ, or X-ray energy of a uranium fission product that supposedly caused a particular solar line in Bharat Radiation range listed in Table 1, particularly when selection was to be made from a vast data of fission products, their emissions and β, γ, and X-ray energies available in literature. Second difficulty arose in realizing the fact that solar lines were caused by chains of fission products starting with very short lived ones such as ^{133}In (180 ms) particularly when data on their actual release is not available in literature. Fortunately, there has been a similarity in the fission products released during Chernobyl reactor accident in 1986 and those supposedly present in solar flare and atmosphere listed in Table 1. For example, the reports on Chernobyl reactor accident in 1986 generally focused on release of medium and long lived fission products such as ^{133}Xe, ^{131}I , ^{133}I, ^{134}I, ^{134}Cs, ^{137}Cs, ^{140}Ba, ^{140}La, ^{95}Zr, ^{141}Ce and ^{144}Ce, ^{90}Sr [13-24]. Particularly, release of ^{131}I radioactivity was significantly high and spread even to far off countries such as India [24]. Interestingly, presence of ^{131}I in solar flare and solar atmosphere is indicated from the fact that the tallest peak at 17.107 nm in the middle of solar spectrum in Fig.1 seems to have caused by 606.31 keV energy ($E_{\beta max}$) of ^{131}I. In fact Table 1 shows the entire chain of fission products ^{131}In, ^{131}Sn, ^{131}Sb, ^{131m}Te, ^{131}Te and ^{131}I have caused 14 solar lines.

The phenomenon of causing solar Bharat Radiation lines can be well understood from the study with radioisotopes [10]. While β, γ and X-ray emissions pass through core-Coulomb space experience an energy loss at eV level. The energy loss is the Bharat Radiation energy, which appears as a solar line in 12.87 to 31 nm range of Bharat Radiation. Understanding the phenomenon became easy since the solar line provided the key information on the energy loss by β, γ or X-ray while passing through core-Coulomb space. Energy equivalence in eV of each solar line wavelength in Table 1 provided the energy loss by a specific β, γ or X-ray. The only step necessary is to select carefully the energy of a fission product for each energy loss by verifying every time whether a smooth graph is resulted or not in Figure 2. Firstly, 12.99 nm (equivalent to 95.45 eV) emission is taken up to know its source of energy (Table 1). Since solar X-rays are up to 12.87 nm range, 12.99 nm is a short Bharat Radiation wavelength. As the solar 12.86 nm (0.096411 keV) X-ray with longest wavelength is expected to face the maximum energy loss 95.45 eV in core-Coulomb space, 0.096411 keV is presumed to be the possible source for 12.99 nm emission. The energy loss 95.45 eV is the Bharat Radiation energy that in turn causes EUV, UV, visible and near infrared radiations on valence excitation. Solar lines longwards of 13.6 nm are produced by β or γ energy of ^{235}U fission products (Table 1). Interestingly, all the three emission β, γ and X-ray faced same loss of energy while passing through core-Coulomb space because β did not behave its particulate nature within excited atom [10].

Maximum energy loss 95.45 eV by 0.096411 keV X-ray appeared as 12.99 nm emission, whereas the minimum energy loss 40.81 eV by 9500 keV ($E_{\beta max}$) energy of ^{131}In appeared as 30.378 nm emission, previously labeled as He II in Fig.1 and Table 1. Very high β, or γ energies of short lived fission products first generate long Bharat Radiation wavelengths, which in turn generate as much as 40% visible and near infrared radiation intensities in gross light intensity, according to Fig.3 in Ref.10. Therefore, presence of short lived fission products such as ^{131}In in solar flare seems to control maximum temperatures on Earth (Table 1). UV intensity from fission products remains always above 83% in gross light intensity. Relatively low β, or γ energies from fission products like ^{103}Ru, ^{99}Mo, ^{131}Te, and ^{132}Te cause UV intensity as high as 97%. Therefore, they can be responsible for Sun's dominant UV emission.

Solar Dynamics Laboratory's (SDO's) Atmospheric Imaging Assembly (AIA) provides 8 spectral bands through a website 'The Sun Today' of which six bands 94, 131, 171, 211, 304 and 335A are chosen for study here [25]. Firstly, these spectral bands have been identified as of X-ray (94A), Bharat Radiation (131, 171, 211, and 304A) and EUV (335A) emissions. The peaks simultaneously appeared at different wavelengths unfolded the fact that 94A X-rays have caused 131A Bharat Radiation, which in turn caused the 335A EUV by Padmanabha Rao Effect. Notably, a solitary line appeared for four months in the spectral EUV band at 335A and at times in Bharat

Radiation band at 304A suggested self-sustained uranium fission from a small site of fission appeared in SDO/AIA images of Sun. This new finding suggests self-sustained uranium fission powers Sunlight.

A critical look at 304A Bharat Radiation, and 1600A and 1700A UV images of Sun in Fig.8 unfolded what causes the Sun's dark spots. Total absence of Bharat, UV, visible light radiation emissions from Sun's dark spots against a bright background suggests uranium fission might have lifted away a large chunk of Sun's core material along with fission fragments into nuclear fallout. A large crater formed at the site of fission on Sun's core surface without any emission appears as Sun's dark spot. Sun's dark spots are not seen at X-ray and EUV since solar flare generally masks the dark spots at these wavelengths.

Sun's dark spots seem to provide the first and key evidence on true existence of the familiar dark matter. (i) The biggest Sun spots estimated to be almost six times to the size of Earth [26] coincides with the general opinion that sizable fraction of the Universe constitutes dark matter [27, 28]. (ii) It is also believed that dark matter doesn't release light [28]. In support of this view, images of Sun in Fig. 8 have provided evidence that Sun's dark spots do not emit Bharat radiation, UV and visible light. Pasquale Dario Serpico and Dan Hooper reviewed prospects for the Fermi satellite (formerly known as GLAST) to detect gamma rays from dark matter [29]. However, this seems to be not possible since no fission products would be left at the site of fission. Therefore, purely the Sun's core material, left at the site of fission devoid of fission products, looking as Sun's dark spot in the absence of any radiation emission might be the familiar dark Matter.

Lastly the current study also unfolded a previously unknown phenomenon in which highly ionized radioisotopic ions attract each other and form a radioactive cloud. Radioactive clouds (nuclear fallouts) are seen in image of Sun in Fig.8 as two solar flares attracting each other to a common place like magnets. Sun seems to have a space free from dust unlike Earth, so radioactive cloud is able to travel great distances in solar atmosphere.

II. Results and discussion

Solar X-ray, Bharat Radiation and EUV wavelengths successively situated in solar spectra (Fig.1) imply that the three experimental discoveries reportedly made in X-ray physics, nuclear physics and atomic spectroscopy apply to solar physics [1,10,12]. (1) On the basis of UV dominant optical radiation detected for the first time from radiochemicals such as ^{131}I, and ^{137}Cs in the laboratory it is believed that uranium fission products such as ^{131}I, and ^{137}Cs in solar flare and atmosphere have caused solar Bharat Radiation lines in 12.87 to 31 nm range, and EUV beyond 31 nm in Figure 1. (2) The optical emission detected from XRF sources present as salts indicated that solar X-rays could be characteristic X-rays of fission products. (3) The optical emission detected from radioisotopes and XRF sources present in metallic form such as metallic ^{57}Co, and Cu XRF source indicated that Sun truly emits a new class of atomic EUV, UV, visible, and near infrared (NIR) radiation emissions from fission fragments regardless of temperature.

The three more physics discoveries resulted while explaining how β, γ, and X-ray could cause the newly detected optical emission within an excited atom of radioisotope or XRF source also apply to solar physics. 1. The predicted Bharat Radiation wavelengths from radioisotope and XRF sources have already been found in solar spectrum [1]. 2. Since Bharat Radiation causes a new class of room temperature atomic spectra of solid radioisotopes and XRF sources, Sun's Bharat Radiation causes atomic emission lines of fission products present in solar flare and atmosphere regardless of Sun's temperatures. This is because exited atoms in radioisotopes remain in a temporary atomic state of matter. 3. The previously unknown atomic phenomenon, Padmanabha Rao Effect known to cause Bharat Radiation and UV dominant optical radiation emissions from radioisotopes and XRF sources also causes solar lines.

The following describes how the first and foremost important task of identifying individual solar lines measured by various researchers within the Bharat Radiation range 12.87 to 31 nm met with unexpected success [2-5]. This could be a welcoming step in solar spectroscopy since only 11 lines in Fig.1 could be labeled as Fe, Mg, Ne and He lines, while many lines could not be identified on the basis of thermally excited atomic spectra. Even those 11 solar lines disagreed with the cited Fe lines, on verification from the latest spectral data [1]. On the other hand, definite presence of Bharat Radiation wavelengths in 12.87 to 31 nm range in solar spectrum pinpointed that specific β, γ, and X-ray energies of radioisotopes have caused the solar lines situated within this range [1]. The author has already opined that uranium fission powers Sunlight [1,9,10]. Therefore, for further advancement of the study a search for specific β, γ, or X-ray energies is made every time from a vast data of β, γ, and X-ray energies of ^{235}U fission products available in literature that caused a particular solar line emission mentioned in Table 1. Table 1 provides source of energies for a complete list of 153 Bharat Radiation lines.

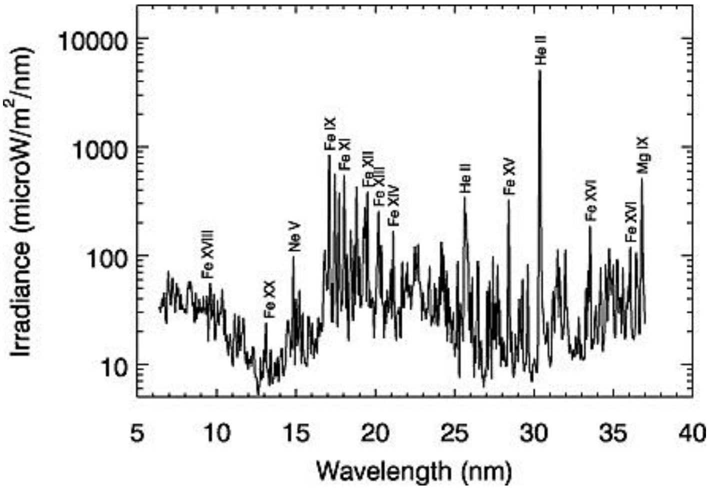


Fig.1. Solar spectrum shown here was obtained by Woods et al. on May 5, 2010 [2]. The flare data from EVE shown here are primarily from the MEGS-A channel measuring the spectrum from 7 to 37 nm.

2.1 X-rays causing solar lines

The following describes how the source of energy is determined for the minimum 12.99 nm emission in Table 1. In terms of energy, 12.99 nm is equivalent to 95.45 eV. On the basis of atomic phenomenon reported earlier [1,10], the line wavelength 12.99 nm holds the key that a very low β, γ, or X-ray energy has lost maximum energy 95.45 eV while passing through core-Coulomb space in an excited atom of a fission product. In the next step, a search made to find the most plausible β, γ, or X-ray energy that caused the solar line led to 12.86 nm, the maximum X-ray wavelength presumed in the solar spectrum in Figure 1, equivalent to 0.096411 keV the lowest X-ray energy in Table 1. Therefore, the explanation is 0.096411 keV X-ray energy has lost 95.45 eV energy while passing through core-Coulomb space. The energy loss 95.45 eV appeared as the 12.99 nm emission.

Next, 13.1 nm Bharat Radiation emission in Figure 1 is taken up to find its source of energy (Table 1). The prominent 9.384 nm (Fe XVIII) X-ray emission (equivalent to 0.131898 keV) in Fig.1 is thought to be the likely source for 13.1 nm emission. Since 13.1 nm is of longer wavelength than the previous case, the energy loss fell to 94.64 eV when 0.131898 keV passed through core-Coulomb space. Essentially, the loss of energy 94.64 eV by 0.131898 keV energy appeared as 13.1 nm emission at higher wavelength.

The third line taken up for identification is 13.3 nm emission equivalent to 93.22 eV. Wood et al in 2011 reported that Fe xx/Fe xxiii 13.3 nm emission behaved almost identically to the GOES X-ray time series [2]. From their reported spectrum reproduced in Fig.1, the shortest solar X-ray wavelength nearly at 7.0 nm (equivalent to 0.177 keV) applies to GOES X-rays is thought to be the likely source for 13.3 nm emission. The 33.5 nm (Fe XVI) emission detected a few minutes after X-rays is regarded in the current study as of EUV, since EUV wavelengths begin from 31 nm [1]. Detection of 13.3 nm Bharat radiation emission as fast as GOES X-rays explains 0.177 keV GOES X-ray energy has lost 93.22 eV in core-Coulomb space and the energy loss appeared as 13.3 nm emission, which has caused 33.5 nm EUV Radiation emission. Their successive measurements validated Padmanabha Rao Effect [10].

Figure 2 shows a graphical plot between γ-, X-, and β energies of the fission products and their energy loss in eV while passing through core-Coulomb space, considering 95.45, 94.64 and 93.22 eV as the first three points. Table 1 unfolds 0.096411 keV energy (12.86 nm) of solar X-rays has lost maximum energy (95.45 eV). The energy loss appeared as 12.99 nm emission. In contrast, 9500 keV ($E_{\beta max}$) of ^{133}In has undergone the minimum loss 40.81 eV, which appeared as 30.378 nm emission. Figure 2 is the first ever graph on Bharat Radiation energy. It reveals that when γ-, X-, and β energies from 0.096411 keV to 1603.5 keV pass through core Coulomb space the Bharat Radiation energy generated shows a steep fall from 95.45 to 43.63 eV. From 1614 to 9500 keV the Bharat Radiation energy shows a slow fall merely from 43.42 to 40.81 eV.

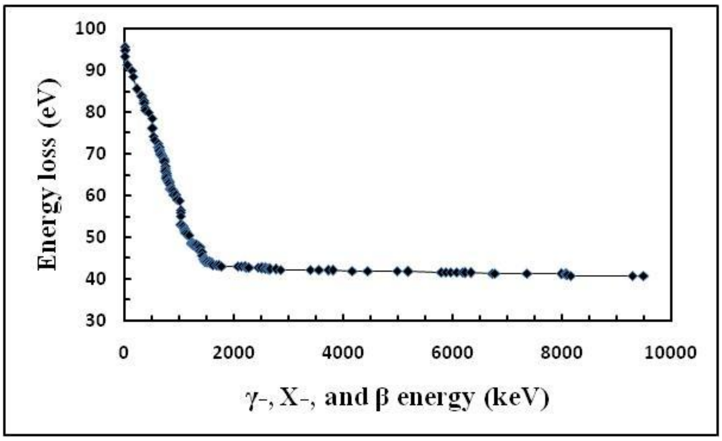


Fig.2: From the data in Table 1, this graphical plot is made between γ-, X-, and β energies (in keV) of the fission products and the energy loss in eV (equivalent of solar lines in nm) that they experienced while passing through core-Coulomb space. This is the first ever graph on Bharat Radiation energy (energy loss) revealing low γ-, X-, and β energies undergo more energy loss, so generate higher Bharat Radiation energy at eV level.

Solar line emissions higher than 13.3 nm did not match with any solar X-ray energies as they may not have been caused by X-ray energies. Therefore, despite solar X-ray range precedes that of Bharat radiation in solar spectrum in Figure 1, Table 1 demonstrates that various γ or β energies of ^{235}U fission products have caused Bharat Radiation wavelengths longwards of 13.3 nm. Emergence of a typical and smooth shape in Figure 2 reflects good correlation between γ-, X-, and β energies in keV of the ^{235}U fission products and their energy loss in eV given in Table 1. Notably, Figure 2 reveals the trend of first ever Bharat Radiation energy generated by γ-, X-, and β energies in keV within the same excited atom. It substantiates the claim that ^{235}U fission takes place on Sun's core surface mainly because of similarity between the fission products mentioned in Table 1 and those released during Chernobyl reactor accident on April 26, 1986 [13-24].

Table 1 discloses similarity between fission products such as ^{133}Xe, ^{131}I , ^{132}Te , ^{134}Cs , ^{137}Cs, ^{99}Mo, ^{95}Zr,^{95}Nb, ^{85}Kr, ^{103}Ru, ^{106}Ru, ^{140}Ba, ^{110m}Ag, ^{141}Ce, ^{144}Ce , ^{89}Sr, and ^{90}Sr released during Chernobyl reactor accident in 1986 and those supposedly present in solar flares and atmosphere. Interestingly, solar lines are caused by a chain of decay products leading to ^{133}Xe, ^{131}I , ^{132}Te , ^{134}Cs , ^{137}Cs, ^{99}Mo , ^{95}Zr,^{95}Nb, ^{85}Kr, ^{103}Ru, ^{106}Ru, ^{140}Ba, ^{110m}Ag, ^{141}Ce, ^{144}Ce , ^{89}Sr, and ^{90}Sr. On literature survey measurement of solar lines between 13.3 to 13.6 nm was not available. Therefore solar lines from 13.6 to 16.7 nm were approximated from Fig.1 just to understand the trend of Bharat Radiation energy in Fig.2.

2.2 15.01 nm emission of ^{133}Xe (Ne V)

The following describes why the solar lines previously labeled as Fe, Mg, Ne, He lines etc acquired now new identifications. During Chernobyl accident, ^{133}Xe showed the maximum radioactivity release [13,14,16], though several isotopes of Xenon are sufficiently produced in fission [17]. However, as ^{133}Xe remains in gaseous phase, quickly transported to even distant countries including India along with ^{85}Kr and ^{131}I, as a result its concentration at any particular area became relatively low, as compared to ^{131}I or ^{137}Cs [24]. A steady rising smooth graph continued in Figure 2 on plotting 346.4 keV ($E_{\beta max}$) of ^{133}Xe indicated its most likely presence in solar flare and atmosphere. It explains that the energy loss 82.60 eV in core-Coulomb space by 346.4 keV appeared as 15.01 nm Bharat Radiation emission previously identified as Ne V. Though ^{133}Xe release is expected to be high over ^{131}I, but might have got diluted during transport of solar flare to distant areas from site of fission. Moreover, its relatively short half life of 5.243 days as compared to 8.0207 days half life of ^{131}I could be another reason why intensity of its peak at 15.01 nm has been found lower than that of ^{131}I peak at 17.107 (Fe IX) in solar spectrum in Figure 1. Table 1 shows a chain of fission products: ^{134}In, ^{133}In, ^{134}Sn, ^{133}Sn, ^{133}Sb, ^{133}Te, ^{133m}Te, and ^{133}I leading to ^{133}Xe caused 14 solar lines.

2.3 Radioiodines

2.3.1 25.63 nm emission of ^{133}I (He II)

In terms of release of radioactivity into the atmosphere, the volatile ^{133}I has been released with much higher radioactivity than ^{131}I during Chernobyl accident; however owing to its short half life of 20.8 hr decayed during transport [14, 18]. For similar reasons the intensity of solar 25.63 nm emission previously labeled as He II might have been lower than that of ^{131}I (17.107 nm, Fe IX)) in solar spectrum in Fig. 1. The 1240.13 keV energy ($E_{\beta max}$) of ^{133}I seems to be source for 25.63 nm emission (Table 1). The fission product has also caused 16.7, and 25.7554 nm emissions. Since ^{133}I is parent nuclide of ^{113}Xe, the same chain of fission products mentioned earlier: ^{134}In, ^{133}In, ^{134}Sn, ^{133}Sn, ^{133}Sb, ^{133}Te, ^{133m}Te led to ^{133}I present in solar flares and atmosphere caused 13 solar lines.

2.3.2 17.107 nm emission of ^{131}I (Fe IX)

In terms of high release of radioactivity into the atmosphere during Chernobyl accident, the volatile ^{131}I stands next to the gaseous ^{133}Xe [13,14]. Maximum activity of ^{131}I was measured in the Pripyat river at Chernobyl [14]. Likewise, primarily isotopes of inert gases and iodine in different chemical forms may have been lifted into the solar flare and atmosphere in the gas phase. ^{131}I might be present in solar flare and atmosphere, since a steady rising smooth graph continued in Figure 2 on plotting 606.31 keV β ($E_{\beta max}$) energy of ^{131}I . This insight explains that the energy loss 72.48 eV in core-Coulomb space by 606.31 keV appeared as 17.107 nm emission previously labeled as Fe IX (Table 1). However, it may not be possible to always measure the maximum intensity for 17.107 nm emission, when radioactivity of ^{131}I would significantly fall after a month, and gets diluted while transporting to other places through radioactive cloud. Table 1 shows a chain of fission products: ^{131}In,^{131}Sn, ^{131}Sb, ^{131m}Te, ^{131}Te leading to ^{131}I have caused 14 solar lines.

2.3.3 20.1734 nm emission of ^{134}I (Fe XIII)

Literature on very short lived radioisotopes released from Chernobyl accident is scarce. The 847.025 keV γ-energy of ^{134}I seems to have caused the 20.1734 nm emission previously identified as Fe XIII. A chain of fission products: ^{134}In, ^{134}Sn, ^{134}Te leading to ^{134}I seemed to be present in solar flare and atmosphere have caused 11 solar lines.

2.3.4 Emissions of ^{132}I and ^{135}I

^{131}I, short-lived radioiodines (^{132}I, ^{133}I, ^{135}I), and short-lived radiotelluriums (^{131m}Te and ^{132}Te) released from Chernobyl accident reached many distant places including Belarus; however these short lived radioiodines decayed faster than ^{131}I [18]. Table 1 shows a chain of fission products: ^{132}In, ^{132}Sn, ^{132m}Sb, ^{132}Sb, ^{132}Te, ^{132m}I leading to ^{132}I present in in solar flare and atmosphere have caused 20 solar lines. Likewise, a chain of fission products: ^{135}Sb, ^{135}Te lading to ^{135}I present in solar flare and atmosphere seemed to have caused 8 solar lines listed in Table 1.
In nutshell, radioiodines alone have produced 66 solar lines in Bharat Radiation range. Experience with ^{131}I and ^{137}Cs has shown that each gamma photon produces more than one light photon [10]. Therefore radioiodines and ^{137}Cs alone contribute significantly to Sunlight.

2.4 Radiotelluriums

Predominantly volatile radioisotopes of iodine, cesium, tellurium including ^{129m}Te,^{131m}Te, and ^{132}Te present in air after Chernobyl accident have been identified by filter sampling [13]. Table 1 shows that 852.21 keV γ energy from^{131m}Te seems to be source for the 20.2424 nm emission, while 1603.5 keV energy ($E_{\beta max}$) of ^{129m}Te for 28.420 nm emission.

2.5 ^{137}Cs, ^{134}Cs,^{141}Ce, ^{144}Ce, ^{89}Sr, ^{90}Sr, ^{95}Zr, ^{95}Nb in solar flare

Besides the noble gases ^{133}Xe and ^{85}Kr, about half of the volatile elements such as ^{131}I, ^{134}Cs , ^{136}Cs, and ^{137}Cs were released during Chernobyl accident [13,14]. The following radionuclides were detected in bodies of those who died due to acute radiation sickness caused by Chernobyl accident: ^{89}Sr, ^{90}Sr, ^{95}Zr, ^{95}Nb, ^{103}Ru (7 kBq), ^{134}Cs (9 kBq), ^{137}Cs (18 kBq), ^{141}Ce, ^{144}Ce [22]. The following radionuclides were found in fecal samples: ^{89}Sr, ^{91}Y, ^{95}Zr, ^{99}Mo, ^{131}I, ^{132}Te, ^{134}Cs, ^{137}Cs, ^{140}Ba, ^{140}La, ^{141}Ce, and ^{144}Ce [23]. In summer 1986 and 1987, significant radioactivity of ^{137}Cs, ^{134}Cs, and ^{144}Ce as compared to that of ^{106}Ru, ^{95}Zr, ^{95}Nb, and ^{90}Sr was recorded in northern areas of Gomel region. Most interestingly, ^{137}Cs in soil and grass was detected to be high in North of Gomel while ^{144}Ce, and ^{95}Nb was high in South of Gomel region [23].

2.6 17.693 nm emission of ^{137}Cs (Fe X)

Figure 1 shows a prominent peak at 17.693 nm. Table 1 shows 661.657 keV γ-energy of ^{137}Cs has caused the 17.693 nm emission previously labeled as Fe X. ^{137}Cs was spread up to Sweden, Belarus, Bulgaria, Greece, some Russian and Ukrainian areas and found significant activity even after several months of Chernobyl accident [14, 19, 20]. Table 1 shows a chain of fission products: ^{137}I, ^{137}Xe and ^{137}Cs present in solar flare and atmosphere seemed to have caused 6 solar lines. Table 1 shows presence of ^{134}Cs in solar flare and atmosphere. The 795.864 KeV γ-energy of ^{134}Cs could be the most likely source for 19.466 nm emission previously identified as Fe XII. It has also caused two more peaks. The 1235.362 keV γ-energy of ^{136}Cs seems to be the source for 25.511 nm emission. Both ^{136}Cs and ^{136m}Ba have caused 3 solar lines. Along with ^{134}Cs and ^{137}Cs, ^{136}Cs was released during Chernobyl accident [20]. ^{138}Xe and ^{138}Cs have caused 2 solar lines. Long lived fission products such as ^{137}Cs and ^{90}Sr present in solar atmosphere and spread uniformly throughout Sun's disk as a result of fall out provide constant source of Sunlight to Earth even when solar flares are reduced to minimum in number.

2.7 Emissions of ^{141}Ce and ^{144}Ce

Table 1 shows evidence of a chain of fission products: ^{141}Cs, ^{141}Ba, ^{141}La leading to ^{141}Ce present in solar flare and atmosphere have caused 4 solar lines. Similarly, likely presence of ^{144}Ba, and ^{144}Ce in solar flare and atmosphere caused 2 solar lines.

2.8 18.0401 nm emission of ^{95}Zr (Fe XI); and ^{95}Nb

Table 1 shows 724.199 keV γ energy of ^{95}Zr has caused 18.0401 nm emission previously labeled as Fe XI. A chain of fission products: ^{95}Rb, ^{95}Sr, ^{95}Y, ^{95}Zr, and ^{95}Nb have caused 8 solar lines.

2.9 ^{99}Mo

A chain of fission products: ^{99}Rb, ^{99}Sr, ^{99}Y, ^{99}Zr, ^{99}Nb leading to ^{99}Mo have caused 8 solar lines.

2.10 Emissions of ^{89}Sr and ^{90}Sr

During Chernobyl accident, ^{90}Sr being less volatile than cesium remained close to the site of fission and at longer distances its deposition has been low [13,14]. However, presence of long lived fission product ^{90}Sr was detected at many places after Chernobyl accident and as far as Bulgaria, though the release of ^{90}Sr has been very low as compared to ^{131}I or ^{137}Cs [20]. A chain of fission products: ^{89}Br, ^{89}Kr, ^{89}Rb, ^{89}Sr, and ^{89}Y present in solar flare and atmosphere seemed to have caused 6 solar lines (Table 1). A chain of fission products: ^{90}Br, ^{90}Kr, ^{90m}Rb, ^{90}Sr, and ^{90}Y present in solar flare and atmosphere seemed to have caused 6 solar lines.

2.11 21.1 nm emission of ^{140}Ba (Fe XIV)

During Chernobyl accident, significant activity of ^{140}Ba was released into air [13,14]. The following fission products including ^{140}Ba were detected by gamma spectrometry ^{99}Mo, ^{99m}Tc, ^{103}Ru, ^{127}Sb, ^{129}Te, ^{132}Te, ^{131}I, ^{132}I, ^{133}I, ^{134}Cs, ^{136}Cs, ^{137}Cs, ^{140}Ba, and ^{140}La. Significant radioactivity of ^{140}Ba was measured in the Pripyat River at Chernobyl [14]. As ^{95}Zr, ^{95}Nb, ^{103}Ru, ^{106}Ru, ^{125}Sb, ^{129m}Te, ^{134}Cs, ^{137}Cs, ^{140}Ba, ^{140}La, ^{141}Ce and ^{144}Ce are expected to settle several kilometers away from site of fission; their activity gets diluted when they travel greater distances [15].

Similarly, the intensity of the ^{140}Ba peak in solar spectrum depends upon several factors particularly its ability to transport from site of fission to solar flare. Presence of ^{140}Ba in solar flare is indicated since 21.1 nm Bharat Radiation emission (previously labeled as Fe XIV) seems to have caused by 1006.19 keV β ($E_{\beta max}$) energy of ^{140}Ba. A chain of fission products: ^{140}I, ^{140}Xe, ^{140}Cs, ^{140}Ba , and ^{140}La present in solar flare and atmosphere seemed to have caused 14 solar lines.

2.12 17.8058 nm emission of ^{85}Kr

Another noble gas ^{85}Kr also was released during Chernobyl accident with activity of just 33 PBq as compared to 1700 PBq of ^{133}Xe [13,14]. ^{85}Kr might be present in solar flare, since a steady rising smooth graph continued in Figure 2 on plotting 687.1 keV ($E_{\beta max}$) energy of ^{85}Kr. It explains that the energy loss 69.63 eV in core-Coulomb space by 687.1 keV appeared as 17.8058 nm emission. Though the radioactivity release of ^{85}Kr is reflected as a fraction of ^{133}Xe during Chernobyl accident, in solar flare the intensity of 17.8058 nm emission from ^{85}Kr was found to be higher than that of 15.01 nm emission from ^{133}Xe. Probably its long half life (10.756 y) is helping to accumulate activity in solar flare and in raising its intensity level. A chain of fission products: ^{85}As, ^{85}Se, ^{85}Br, ^{85m}Kr, leading to ^{85}Kr present in solar flare and atmosphere seemed to have caused 8 solar lines.

2.13 Nature of Bharat Radiation spectrum

The fact that low γ-, X-, and β energy undergoing relatively more loss, and high energy undergoing less loss while passing through core Coulomb space seen in Fig.2 is in complete agreement with what was predicted for Bharat Radiation from radioisotopes and XRF sources [Fig.3, Ref. 1]. Figure 3 provides for the first time the typical nature of Bharat Radiation spectrum.

2.14 Control on Sun's high temperatures

Figure 3 shows γ-, X-, and β energies from 0.096411 keV to 1603.5 keV have caused 105 solar lines from 12.99 to 28.420 nm, and the graph exhibited a steep raise. These relatively low γ-, X-, and β energies ultimately cause dominant solar EU and UV in the gross light intensity while visible and near infrared radiations remain very low [10]. Since near infrared radiation intensity levels remain very low, these low γ-, X-, and β energies seem to be responsible for low temperatures of the Earth's atmosphere. Afterwards the graph slowly attained a plateau. A wide range of high γ-, X-, and β energies from 1614 to 9500 keV originating from very short lived fission products with half life of few seconds or minutes caused just 48 solar lines and within a narrow range of 28.555 to 30.378 nm. These relatively high γ-, X-, and β energies ultimately cause a dip in solar UV though UV always remain nearly above 83% in the gross light intensity while visible and near infrared radiations raise correspondingly [10]. Rise in near infrared radiation intensity levels from these high γ-, X-, and β energies seem to be responsible for high temperatures of the Earth's atmosphere. Most interestingly, 30.378 nm Bharat Radiation emission sets the upper limit for Sun's high temperatures. It will not allow exceeding Sun's high temperature beyond a certain limit. That is how all living beings are saved without causing intolerable heat from Sun.

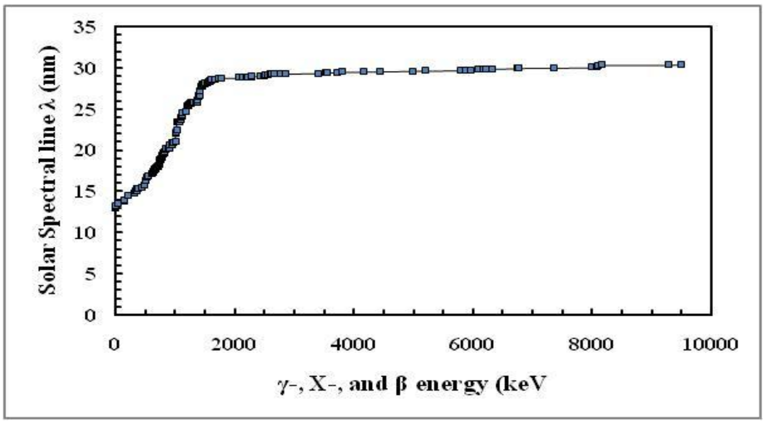


Fig. 3. Graphical plot between γ-, X-, and β energies (keV) of the ^{235}U fission products and solar line wavelengths that they produced in the Bharat Radiation range from 12.99 to 30.378 nm shown in Table 1. The graph shows solar Bharat Radiation wavelengths gradually attain plateau after 1600 keV γ-, X-, and β energy.

Table 1: The X-ray or ^{235}U fission product given in 2nd column is responsible for producing the solar line given in 7th column. The γ-, X-, or β energy given in 5th column of a fission product experiences energy loss in eV given in 6th column in core –Coulomb space. The energy loss simply appears as solar line in Bharat Radiation range (7th column).

	γ, β or X-ray of fission products					Solar line produced	Previous line identity
	Source of solar line	Half life	γ, β or X-ray emission taking part	γ, β or X-ray energy causing solar line	Energy lost in core-Coulomb space		
				(keV)	(eV)	(nm)	
1.	Solar X-rays		X-ray	0.096411 (12.86 nm)	95.45	12.99	
2.	Solar X-rays		X-ray	0.131898 (9.384 nm)	94.64	13.1	Fe VIII
3.	GOES X rays		X-ray	0.177 (7.0 nm)	93.22	13.3	Fe XX
4.	^{106}Ru	373.59 d	$E_{\beta max}$	39.4	91.17	13.6	
5.	^{99}Mo	65.94 h	γ	140.511	89.84	13.8	
6.	^{131}Te	25 m	γ	149.716	88.56	14.0	
7.	^{132}Te	3.204 d	$E_{\beta max}$	215.14	85.51	14.5	
8.	^{144}Ce	284.893 d	$E_{\beta max}$	318.7	83.77	14.8	
9.	^{133}Xe	5.243 d	$E_{\beta max}$	346.4	82.60	15.01	Ne V
10.	^{131}I	8.0207 d	γ	364.489	82.11	15.1	
11.	^{95}Zr	64.02 d	$E_{\beta max}$	368.07	81.04	15.3	
12.	^{140}I	0.86 s	γ	376.657	80.51	15.4	
13.	^{141}Ce	32.501 d	$E_{\beta max}$	435.26	79.99	15.5	
14.	^{103}Ru	39.26 d	γ	497.08	78.47	15.8	
15.	^{137}Cs	30.07 y	$E_{\beta max}$	513.97	76.06	16.3	
16.	^{133}I	20.8 h	γ	529.872	74.24	16.7	
17.	^{90}Sr	28.79 y	$E_{\beta max}$	546	73.39	16.8929	
18.	^{131}I	8.0207 d	$E_{\beta max}$	606.31	72.48	17.107	Fe IX
19.	^{134}Te	41.8 m	$E_{\beta max}$	626.57	71.67	17.3	

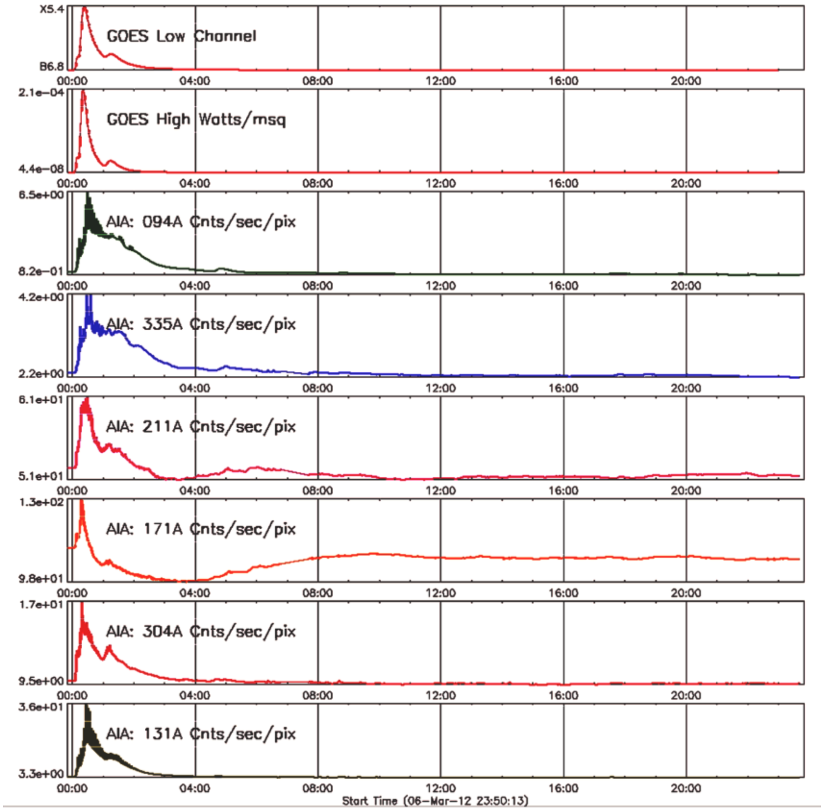
20.	^{132}I	2.295 h	γ	630.19	71.61	17.315	
21.	^{132}Sb	2.79 m	γ	635.6	71.49	17.3442	
22.	^{131}I	8.0207 d	γ	636.989	71.15	17.425	
23.	^{133m}Te	55.4 m	γ	647.51	70.65	17.548	
24.	^{110m}Ag	249.79 d	γ	657.7622	70.27	17.645	
25.	^{134}Cs	2.0648 y	$E_{βmax}$	658.11	70.18	17.666	
26.	^{133m}Te	55.4 m	$E_{βmax}$	658.38	70.15	17.6745	
27.	^{137}Cs	30.07 y	γ	661.657	70.08	17.693	Fe X
28.	^{132}I	2.295 h	γ	667.718	69.98	17.717	
29.	^{85}Kr	10.756 y	$E_{βmax}$	687.1	69.63	17.8058	
30.	^{132}Sb	2.79 m	γ	696.8	68.97	17.9758	
31.	^{95}Zr	64.02 d	γ	724.199	68.73	18.0401	Fe XI
32.	^{99}Y	1.47 s	γ	724.2	68.65	18.0594	
33.	^{133}Te	12.5 m	$E_{βmax}$	726.4	68.45	18.1130	
34.	^{131}Te	25 m	$E_{βmax}$	732.88	68.06	18.2167	
35.	^{132}I	2.295 h	$E_{βmax}$	738.14	67.09	18.4793	
36.	^{140}I	0.86 s	γ	738.6	66.94	18.521	
37.	^{99}Mo	65.94 h	γ	739.5	66.44	18.660	
38.	^{134}Te	41.8 m	γ	742.586	65.91	18.8123	
39.	^{138}Xe	14.08 m	$E_{βmax}$	743.32	65.87	18.8216	
40.	^{91}Sr	9.63 h	γ	749.8	65.84	18.8299	
41.	^{95}Zr	64.02 d	γ	756.729	65.77	18.85	
42.	^{95}Nb	34.975 d	γ	765.794	65.35	18.9711	
43.	^{134}Te	41.8 m	γ	767.20	65.27	18.995	
44.	^{132}I	2.295 h	γ	772.6	64.84	19.122	
45.	^{131m}Te	30 h	γ	773.67	64.30	19.2813	
46.	^{140}Xe	13.60 s	Γ	774.12	64.07	19.3512	
47.	^{134}Cs	2.0648 y	γ	795.864	63.69	19.466	Fe XII
48.	^{140}Xe	13.60 s	γ	805.52	63.27	19.597	
49.	^{140}La	1.6781 d	γ	815.772	63.24	19.605	
50.	^{132}Sb	2.79 m	γ	816.6	63.19	19.6210	
51.	^{136}Cs	13.16 d	γ	818.514	63.12	19.6423	
52.	^{90m}Rb	258 s	γ	831.69	62.45	19.8538	
53.	^{85m}Kr	4.48 h	$E_{βmax}$	840.81	61.65	20.1112	
54.	^{134}I	52.5 m	γ	847.025	61.46	20.1734	FeXIII
55.	^{131m}Te	30 h	γ	852.21	61.25	20.2424	
56.	^{134}I	52.5 m	γ	884.09	61.19	20.2609	
57.	^{135}Xe	9.14 h	$E_{βmax}$	901.23	61.17	20.2705	
58.	^{89}Zr	78.41 h	γ	908.96	60.14	20.6169	
59.	^{131}Sb	23.03 m	γ	943.4	60.11	20.6258	
60.	^{133}Sn	1.45 s	γ	962.18	59.24	20.93	
61.	^{132}Sb	2.79 m	γ	973.9	59.11	20.9771	
62.	^{140}Ba	12.752 d	$E_{βmax}$	1006.19	58.76	21.1	Fe XIV
63.	^{140}Ba	12.752 d	$E_{βmax}$	1020.04	56.36	22.00	
64.	^{91}Sr	9.63 h	γ	1024.3	55.85	22.20	
65.	^{89}Rb	15.15 m	γ	1031.94	55.10	22.50	
66.	^{135}I	6.57 h	γ	1038.76	52.91	23.435	
67.	^{136m}Ba	0.3084 s	γ	1048.073	52.89	23.44	
68.	^{134}I	52.5 m	γ	1072.55	52.82	23.4730	
69.	^{133}Sb	2.5 m	γ	1096.22	52.25	23.73	
70.	^{89}Br	4.348 s	γ	1097.82	51.71	23.978	
71.	^{90}Kr	32.32 s	γ	1118.69	51.51	24.0717	
72.	^{131m}Te	30 h	γ	1125.46	51.19	24.2215	
73.	^{91}Sr	9.63 h	$E_{βmax}$	1127.06	51.02	24.30	
74.	^{135}I	6.57 h	γ	1131.511	50.63	24.49	
75.	^{132}I	2.295 h	$E_{βmax}$	1182.09	50.38	24.61	
76.	^{99}Mo	2.75 d	$E_{βmax}$	1214.52	48.85	25.38	
77.	^{137}I	24.5 s	γ	1218	48.82	25.396	
78.	^{131}Sn	56 s	γ	1226.03	48.70	25.4596	
79.	^{136}Cs	13.16 d	γ	1235.362	48.60	25.511	
80.	^{133}I	20.8 h	$E_{βmax}$	1240.13	48.38	25.63	He II
81.	^{133}Sb	2.5 m	$E_{βmax}$	1247.49	48.32	25.66	

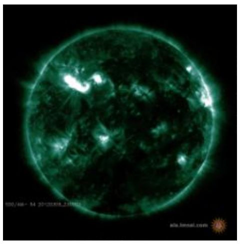
82.	^{135}I	6.57 h	γ	1260.409	48.26	25.6919	
83.	^{135}Sb	1.71 s	γ	1279.01	48.14	25.7547	
84.	^{133}I	20.8 h	γ	1298.223	48.14	25.7554	
85.	^{134}I	52.5 m	$E_{\beta max}$	1307.63	48.10	25.7772	
86.	^{131}Sb	23.03 min	$E_{\beta max}$	1313.62	48.07	25.7914	
87.	^{140}La	1.6781 d	$E_{\beta max}$	1349.89	48.04	25.81	
88.	^{134}Cs	2.0648 y	γ	1365.185	47.98	25.84	
89.	^{110m}Ag	249.79 d	γ	1384.3	47.69	26.00	
90.	^{135}I	6.57 h	$E_{\beta max}$	1387.58	46.83	26.4772	
91.	^{132}I	2.295 h	γ	1398.57	46.51	26.6586	
92.	^{140}La	1.6781 d	$E_{\beta max}$	1414.02	46.48	26.6759	
93.	^{85}Se	31.7 s	γ	1427.2	45.58	27.20	
94.	^{138}Cs	33.41 m	γ	1435.795	44.74	27.71	
95.	^{85}As	2.021 s	γ	1454.55	44.71	27.73	
96.	^{135}I	6.57 h	γ	1457.56	44.40	27.927	
97.	^{132}I	2.295 h	$E_{\beta max}$	1466.72	44.32	27.976	
98.	^{132m}I	1.387 h	$E_{\beta max}$	1482.94	44.25	28.019	
99.	^{89}Sr	50.53 d	$E_{\beta max}$	1495.1	44.16	28.074	
100.	^{85}As	2.021 s	$E_{\beta max}$	1510	44.10	28.114	
101.	^{91}Y	58.51 d	$E_{\beta max}$	1544.8	44.06	28.143	
102.	^{134}In	138 ms	γ	1560.9	43.90	28.245	
103.	^{134}I	52.5 m	$E_{\beta max}$	1586.54	43.78	28.317	
104.	^{140}La	1.6781 d	γ	1596.21	43.63	28.415	Fe XV
105.	^{129m}Te	33.6 d	$E_{\beta max}$	1603.5	43.63	28.420	
106.	^{132}I	2.295 h	$E_{\beta max}$	1614	43.42	28.555	
107.	^{135}I	6.57 h	γ	1678.027	43.41	28.559	
108.	^{140}La	1.6781 d	$E_{\beta max}$	1678.65	43.38	28.583	
109.	^{85}As	2.021 s	$E_{\beta max}$	1727	43.29	28.643	
110.	^{132}Sn	39.7 s	$E_{\beta max}$	1777.85	43.16	28.727	
111.	^{131}Te	25 m	$E_{\beta max}$	2083.79	43.07	28.786	
112.	^{132}I	2.295 h	$E_{\beta max}$	2136.67	43.03	28.816	
113.	^{133}Te	12.5 m	$E_{\beta max}$	2200.23	42.99	28.842	
114.	^{89}Rb	15.15 m	$E_{\beta max}$	2215.81	42.91	28.896	
115.	^{95}Rb	337.5 ms	$E_{\beta max}$	2279	42.88	28.917	
116.	^{90}Y	64 h	$E_{\beta max}$	2280.1	42.79	28.974	
117.	^{131}In	0.282 s	γ	2434.03	42.77	28.988	
118.	^{141}La	3.92 h	$E_{\beta max}$	2502	42.71	29.032	
119.	^{144}Ba	11.5 s	$E_{\beta max}$	2516.63	42.67	29.06	
120.	^{141}Ba	18.27 m	$E_{\beta max}$	2565.13	42.65	29.073	
121.	^{85}Br	2.9 m	$E_{\beta max}$	2565.13	42.60	29.103	
122.	^{90}Kr	32.32 s	$E_{\beta max}$	2611.99	42.46	29.198	
123.	^{140}Xe	13.60 s	$E_{\beta max}$	2632.41	42.42	29.228	
124.	^{103}Tc	54.2 s	$E_{\beta max}$	2660	42.42	29.231	
125.	^{132}Sb	2.79 m	$E_{\beta max}$	2772.42	42.39	29.251	
126.	^{90}Br	1.91 s	$E_{\beta max}$	2850	42.34	29.282	
127.	^{99}Nb	15 s	$E_{\beta max}$	3403.49	42.29	29.317	
128.	^{99}Zr	2.1 s	$E_{\beta max}$	3542.73	42.21	29.375	
129.	^{132m}Sb	4.10 m	$E_{\beta max}$	3561.26	42.18	29.394	
130.	^{137}Xe	3.818 m	$E_{\beta max}$	3717.51	42.11	29.446	
131.	^{132}Sb	2.79 m	$E_{\beta max}$	3815.31	42.06	29.478	
132.	^{137}Xe	3.818 m	$E_{\beta max}$	4173	42.02	29.507	
133.	^{95}Y	10.3 m	$E_{\beta max}$	4453	41.98	29.532	
134.	^{89}Kr	3.15 m	$E_{\beta max}$	4990	41.87	29.611	
135.	^{141}Cs	24.94 s	$E_{\beta max}$	5196	41.86	29.620	
136.	^{91}Rb	58.4 s	$E_{\beta max}$	5797.37	41.77	29.686	
137.	^{95}Rb	377.5 ms	$E_{\beta max}$	5799.91	41.76	29.691	
138.	^{137}I	24.5 s	$E_{\beta max}$	5880	41.75	29.699	
139.	^{135}Te	19 s	$E_{\beta max}$	5960	41.69	29.739	
140.	^{95}Sr	23.90 s	$E_{\beta max}$	6087	41.64	29.778	
141.	^{85}Se	31.7 s	$E_{\beta max}$	6182	41.59	29.810	
142.	^{140}Cs	63.7 s	$E_{\beta max}$	6220	41.57	29.827	
143.	^{91}Kr	8.57 s	$E_{\beta max}$	6331.21	41.54	29.846	

144.	^{131}In	0.282 s	$E_{\beta max}$	6739.96	41.43	29.928	
145.	^{99}Rb	50.3 ms	$E_{\beta max}$	6780	41.39	29.955	
146.	^{134}Sn	1.12 s	$E_{\beta max}$	7370	41.36	29.979	
147.	^{133}Sn	1.45 s	$E_{\beta max}$	7990	41.28	30.032	
148.	^{140}I	0.86 s	$E_{\beta max}$	8085.71	41.21	30.089	
149.	^{99}Sr	0.269 s	$E_{\beta max}$	8090	41.16	30.123	
150.	^{134}In	138 ms	$E_{\beta max}$	8100	41.03	30.22	
151.	^{89}Br	4.348 s	$E_{\beta max}$	8160	40.88	30.331	
152.	^{132}In	0.201 s	$E_{\beta max}$	9292.9	40.87	30.340	
153.	^{133}In	180 ms	$E_{\beta max}$	9500	40.81	30.378	He II

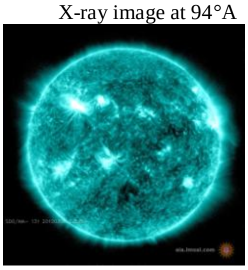
2.15 Evidences of Padmanabha Rao Effect in AIA spectral bands and SDO/AIA images of Sun

Table 1 has provided evidences that β, γ and X-ray energies of ^{235}Uranium fission products have caused the solar lines in Bharat Radiation range from 12.87 to 31 nm. In the following study, AIA spectral bands and SDO/AIA images of Sun further support the view that ^{235}Uranium fission causes Sunlight by Padmanabha Rao Effect.

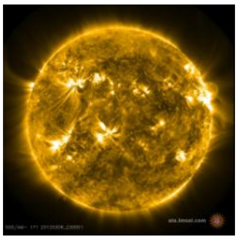




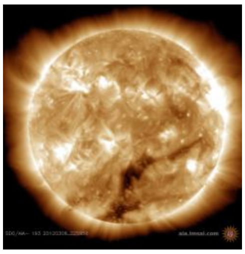
X-ray image at 94°A



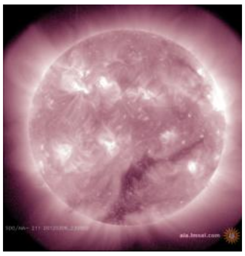
Bharat Radiation image at 131 °A



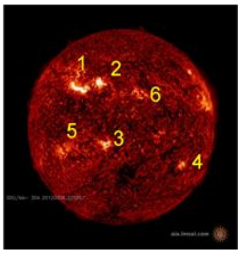
Bharat Radiation image at 171°A



Bharat Radiation image at 193°A



Bharat Radiation image at 211°A



Bharat Radiation image at 304°A

EUV image at 335°A

Fig.4. AIA spectral bands and SDO/AIA Sun's images recorded on 6 March 2012 at 94 Å are identified here as of X-rays, 131, 171, 193, 211, and 304 Å as of Bharat Radiation, and 335°A as of EUV.

Fig.4 shows simultaneous presence of a sharp peak at 00:30 hr with a shoulder at 01:00 hr approximately in all the six spectral bands. Since solar X-rays range up to 128.7 °A, the spectral band 94 °A is identified as X-ray band. Likewise, as Bharat Radiation ranges from 12.87 to 31 nm, the spectral band 131°A is identified as Bharat Radiation band caused by 0.131898 keV X-rays, equivalent to 9.384 nm **(**Table 1). Only one spectral band 335°A is available for EUV. Simultaneous presence of sharp peaks looking alike within 4:00 hr in AIA spectral bands 94 and 335A represent very bright solar flare on the top left (marked 1 at 304A) in the SDO/AIA images of Sun observed at 94, 131, and 335A. These two findings holds the key that X-rays at 94°A have caused Bharat Radiation at 131A, which in turn caused EUV at 335A by Padmanabha Rao Effect.

Simultaneous presence of peaks at spectral bands 171.07 °A caused by 606.31 keV ($E_{\beta max}$) of ^{131}I, 211°A by 1006.19 keV β energy ($E_{\beta max}$) of ^{140}Ba, and 304 °A by 9500 keV β energy ($E_{\beta max}$) of ^{133}In suggest presence of ^{131}I, ^{140}Ba, and ^{133}In in a single solar flare. ^{133}In decays ultimately to ^{133}Xe. Seemingly, all these fission products were released from the most intense solar flare on the top left (marked 1 at 304A) in the images of the Sun. The shoulder on the right side of the peak at 01:00 hr could be from the immediately next solar flare (marked 2 at 304°A).

AIA images of Sun help in differentiating new sites of fission from the old. Although all the images of Sun in Fig.4 display 6 solar flares of considerable size, the two solar flares in the top row at 94°A X-ray band showing intense brightness are regarded as new sites. These sites marked 1 and 2 appeared bright even in the Bharat Radiation image at 304A because of the abundant release of ^{133}In (180 ms) firstly in fission reaction. Presence of 9500 keV β energy ($E_{\beta max}$) of ^{133}In in solar flares over the sites 1 and 2 caused the sharp peak and shoulder in AIA Bharat Radiation band at 304A. The two intense solar flares marked 1 and 2 might be the new sites of fission.

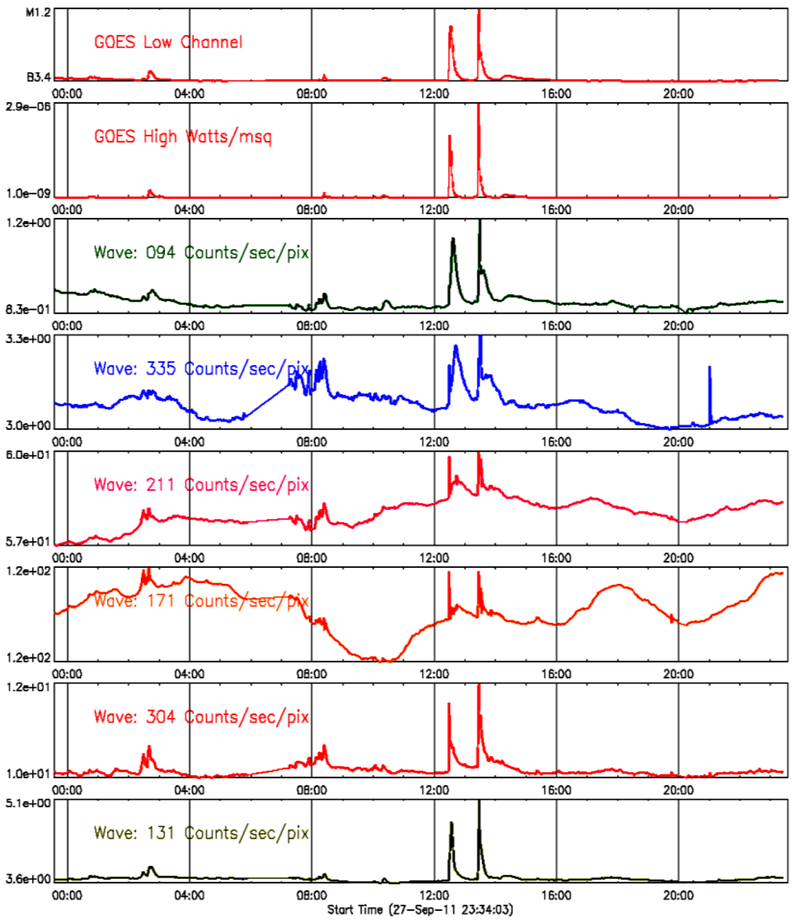
Uranium fission on the Sun is a typical example of a sustained reaction. In Bharat Radiation image 304A, the intensity of solar flare marked 3 is visibly low as compared to solar flares 1 and 2 indicating that fission took place some time ago. It is because the site has already released significant ^{133}In radioactivity by the time of detection. The brightness dipped for solar flare marked 4 and dipped further for solar flares marked 5 and 6. Hence the second flat peak seen at 171A after 4:00 hr is absent in Bharat radiation band at 304A. While the sites 1, 2 signify the new sites of fission, 3, 4, 5 and 6 relatively the older ones.

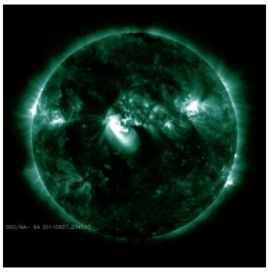
Solar flare in Bharat Radiation image at 304A and X-ray image at 94A, as well as the sharp peak in Bharat Radiation band at 304A and X-ray band look alike; however Bharat Radiation and X-rays originate from two different short lived fission products. While β- energy of ^{133}In causes Bharat Radiation at 304A, it is difficult to pinpoint the exact source of 94A X-rays though solar X-rays up to 12.87 nm in Figure 1.

Bharat Radiation band at 171°A displayed a sharp and the most intense peak distinctly different from others but dipped to base level at around 3:00 hr when the detector has scanned the solar flare on the top left (marked 1 at 304A) in the image of the Sun at 171°A. The nuclear fallout situated much above the site of fission was shined by Bharat Radiation generated by 606.31 keV ($E_{\beta max}$) of ^{131}I, so appeared as bright solar flare. The maximum intensity of the sharp peak in spectral band at 171A is a clear indication of high release of ^{131}I during Uranium fission as was the case during Chernobyl accident. Uniform brightness over all the sites in SDO/AIA image at 171A explain that the old sites 4, 5 and 6 sustained release of ^{131}I activity comparable to that from the new sites 1, 2 and 3. Uniform glow all over the image of Sun at 171 °A is due to widespread volatile and gaseous ^{131}I radioactivity in radioisotopic ionic cloud in solar atmosphere. The second intense flat peak ranging from 4:00 hr to 24:00 hr in Bharat Radiation band at 171A was mainly due to sustained release of ^{131}I from old sites 4 and 6.

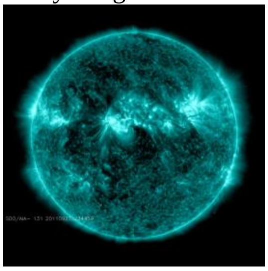
Spectral Bharat Radiation band at 193A is not available, yet the status of Sun's Bharat Radiation emission at 193A became known from the six solar flares in the Bharat Radiation image at 193°A (19.2813 A in Table 1). Six nuclear fallouts appeared as six solar flares when shined by Bharat Radiation generated by 773.67 keV γ energy of ^{131m}Te. Presence of ^{131m}Te in radioisotopic ionic cloud in solar atmosphere has caused uniform brightness throughout the SDO/AIA Sun's image at 193°A. Since ^{131m}Te decays to ^{131}I solar images at 171 and 193°A look alike.

Presence of Sharp peak and shoulder up to 3:00 hr in the spectral Bharat Radiation band at 211A indicates release of radioactivity of ^{140}Ba from the sites 1 and 2. In the Bharat Radiation band at 211°A, the second peak lasted for a brief period from nearly 3:30 to 10:00 hr with intensity lower than that of 171°A. Possibly, ^{140}Ba radioactivity might have decayed to low levels from old sites 4 and 6. As such release of radioactivity of ^{140}Ba remains lower than that of ^{131}I during Uranium fission. Presence of ^{140}Ba in radioisotopic ionic cloud in solar atmosphere has caused uniform brightness throughout the Sun's image at 211°A, yet significant amount of Bharat Radiation escaped from Sun as can be evident from the images of Sun at 193 and 211A. Most importantly, the images at 193 and 221A showed a region looking like a black belt between sites 3 and 4 due to absence of radioisotopic ionic cloud containing ^{140}Ba at that particular area in Sun's atmosphere, discussed later.

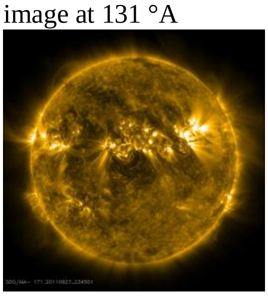




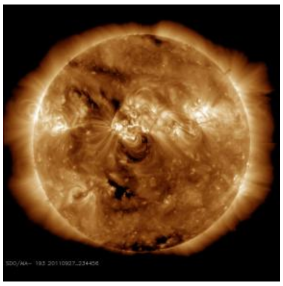
X-ray image at 94°A



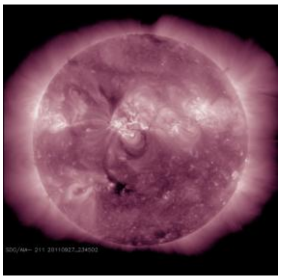
Bharat Radiation image at 131 °A



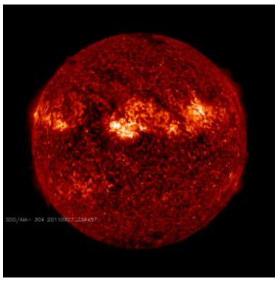
Bharat Radiation image at 171°A



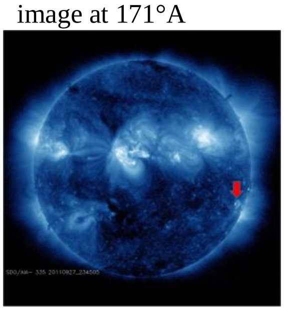
Bharat Radiation image at 193°A



Bharat Radiation image at 211°A



Bharat Radiation image at 304°A



EUV image at 335°A

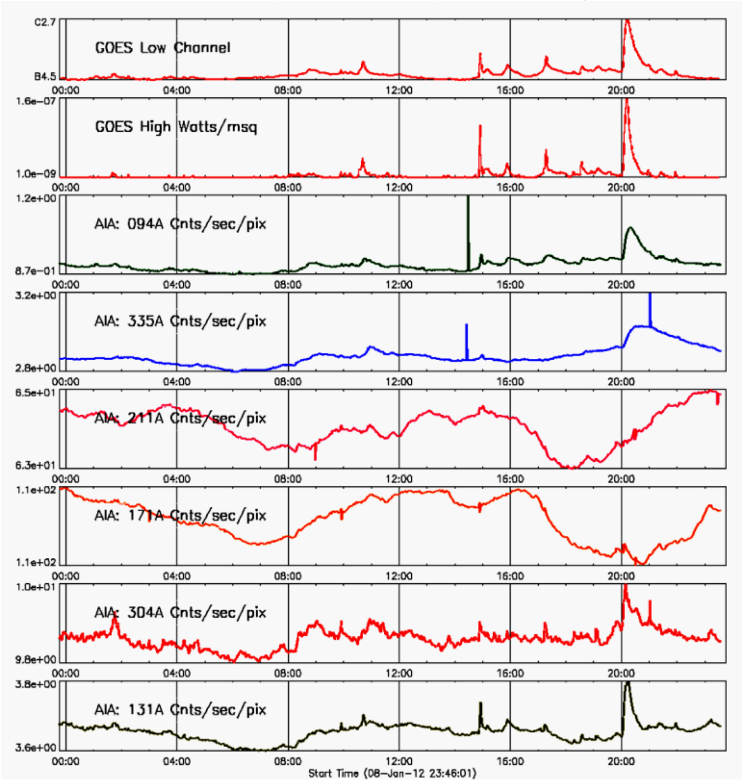
Fig.5. AIA spectral bands and SDO/AIA Sun's images recorded on 27 September 2011 at 23:34:03 reveal a spectral line consistently appeared at 21:00 hr for nearly months from 27- Sep- 11 to 30-Jan-12 in the EUV band at 335A from the site of fission marked by red arrow in the in EUV image at 335A signify self-sustained uranium fission taking place from the site on Sun's surface.

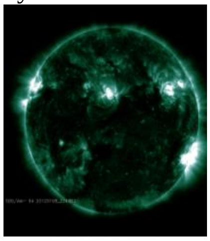
In Figure 5, the simultaneous peaks in X-ray, Bharat Radiation, and EUV bands approximately at 2:30 hr, 8:30 hr, 12:30 hr, and 13:30 hr indicate sustained uranium fission taking place simultaneously at several sites. The two adjacent intense peaks at 12:30 hr, and 13:30 hr in the said spectral bands represent the most bright solar flare visible in the middle of solar images seems from two new adjacent sites of fission. The reasons why solar flares look alike in Bharat Radiation image at 304A and X-ray image at 94A has been discussed already. The mount like intensities in the Bharat radiation bands at 171 and 211A and uniform glow throughout Sun's disk in the images at 171 and 211A was due to presence of ^{131}I and ^{140}Ba in solar flares over and above sites of fission and in radioisotopic ionic cloud in solar atmosphere.

2.16 Self- sustained fission for 4 months

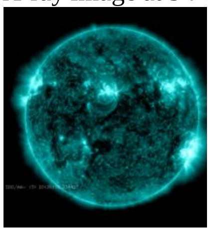
Sun seems to have abundant uranium deposits to ignite self-sustained uranium fission, since the sites of fission acted as a natural nuclear reactor as presumably happened long ago in Africa [30-33]. Neutrons from site of fission travel long distances in Sun's atmosphere and trigger fission simultaneously at different places. A sharp line at 21:00 hr in EUV band at 335A in Fig.5 uncommonly present for four months from 27- Sep- 11 to 30-Jan-12 exemplifies a typical example of self- sustained fission. The author has succeeded in identifying the site of fission marked by red arrow in EUV image at 335A in Fig.5 as source of the line in spectral EUV band at 335A, and also identified the same site in Fig.6 marked by yellow arrow in Bharat Radiation image at 304A. It is to note that Bharat Radiation at 304A and EUV at 335A originate from two different short lived fission products. Figures 5 and 6 explain that short lived fission products emit characteristic X-rays other than those at 94A. And those X-rays have supposedly caused Bharat Radiation, in turn EUV line at 21: 00 hr.

Figure 6 demonstrates self–sustained fission reaction on 8th January 2012 that started on 27th September 2011 at the site marked by yellow arrow in image 304A. As discussed earlier, the sharp line at 21:00 hr in the Bharat Radiation band at 304A was caused by 9500 keV β energy ($E_{\beta max}$) of ^{133}In present in solar flare over the site marked by yellow arrow in Bharat Radiation image at 304A. Simultaneously a line appeared at 21:00 hr in spectral band at 335A. It is to note that these two lines at 304A Bharat Radiation and 335A EUV originate from two different short lived fission products. A small bright solar flare visible in all images of Sun in Fig.6 has caused a sharp line both in the X-ray band at 94A and EUV band at 335A at around 14:30 hr suggesting X-rays at 94A and some X-ray wavelengths close to 94A have caused Bharat Radiation, in turn the EUV at 335A within the small sized flare solar flare. Though the site is visible even at other wavelengths, lines appeared only at two wavelengths 94A and 335A. Probably all the Bharat Radiation photons were spent in causing EUV line at 335A by valence excitation.

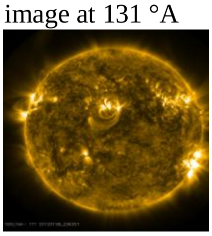




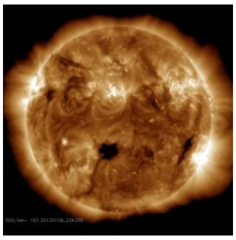
X-ray image at 94°



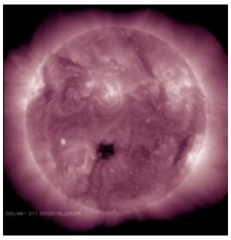
Bharat Radiation image at 131 °A



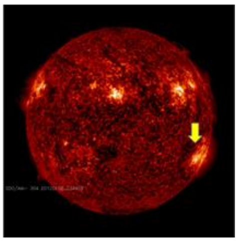
Bharat Radiation image at 171°A



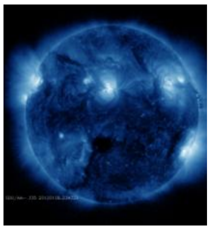
Bharat Radiation image at 193°A



Bharat Radiation image at 211°A



Bharat Radiation image at 304°A

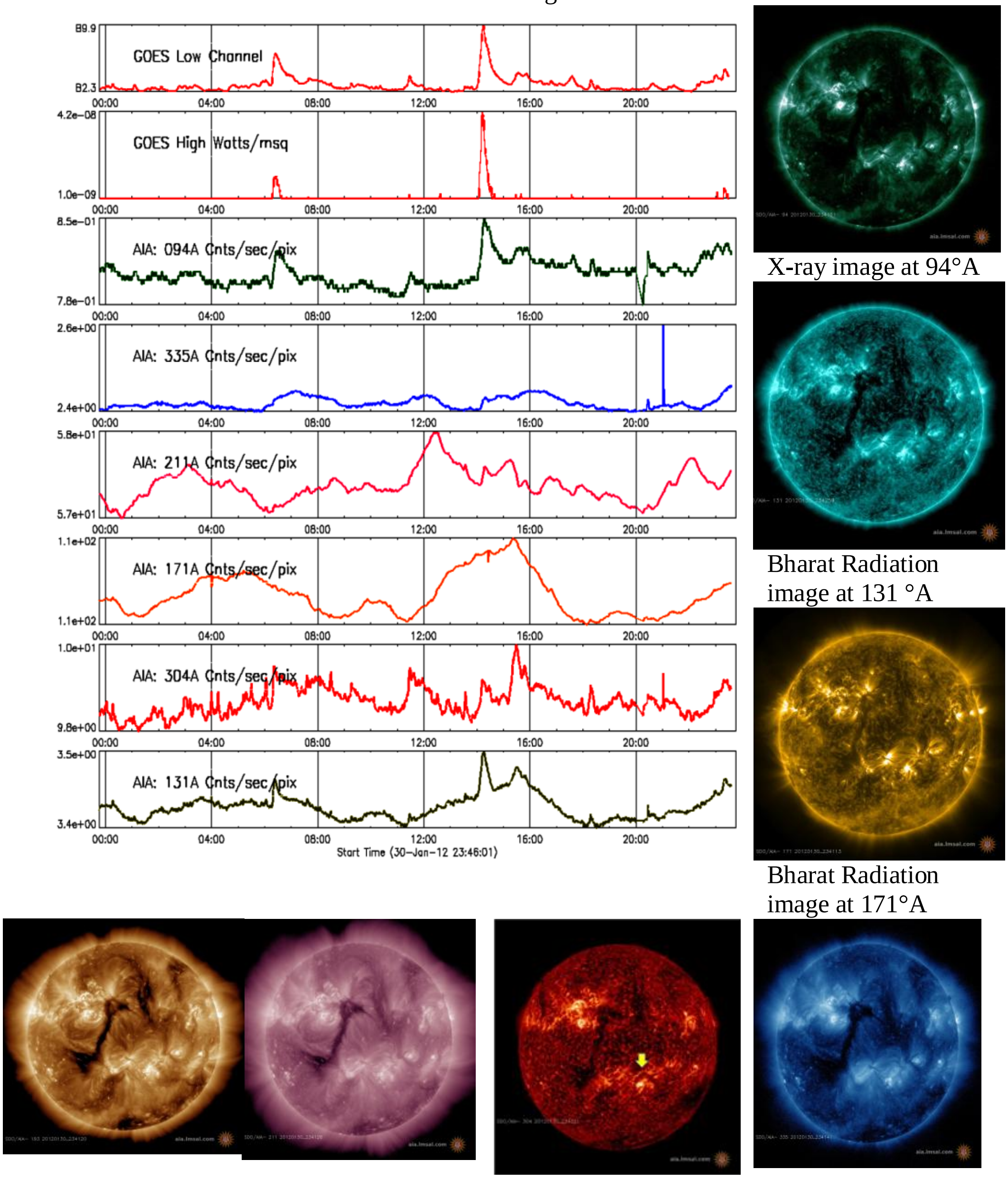


EUV image at 335'

Fig.6. AIA Spectral bands and SDO/AIA images of Sun measured on 8th January 2012.

2.17 Sustained Uranium fission for four months until 30 January 2012

Consistent release of ^{133}In radioactivity on 30-Jan-12 that started on 27- Sep- 11 from a small site of fission pinpointed by yellow arrow in the SDO/AIA Bharat Radiation image at 304A in Fig.7 provides further support to the view on self–sustained fission on Sun's surface. It is already discussed why lines are simultaneous present in Bharat Radiation band at 304A and EUV band at 335A in Figs 6 and 7.



X-ray image at 94°A

Bharat Radiation image at 131 °A

Bharat Radiation image at 171°A

Bharat Radiation image at 193°A

Bharat Radiation image at 211°A

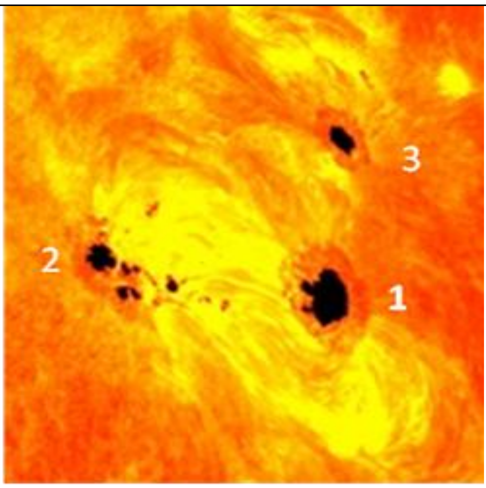
Bharat Radiation image at 304°A

EUV image at 335°A

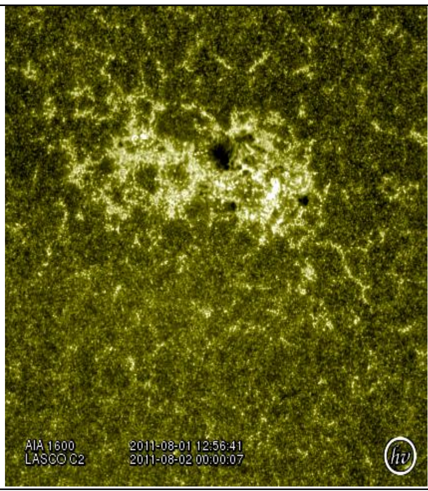
Fig. 7. AIA Spectral bands and SDO/AIA images of Sun recorded on 30 January 2012.

2.18 Explanation on Sun's dark spots

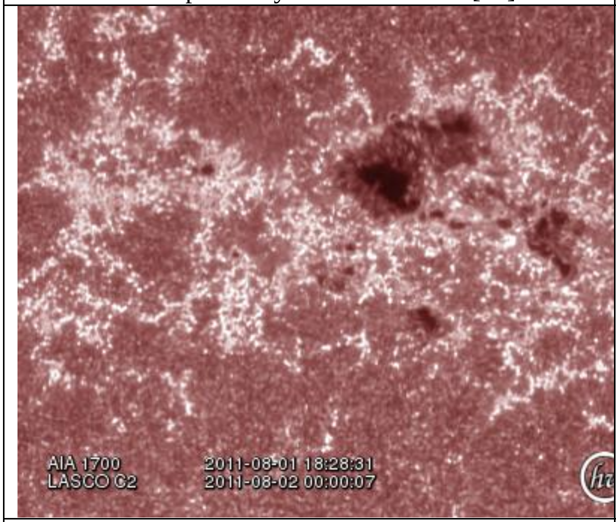
The physics of Sun's dark spots remained an unresolved mystery in solar physics.. For the first time, the current study has made an attempt to explain why Sun spots were created and what they constitute. In order to understand Sun's dark spots, it is necessary to critically examine solar flares seen in SDO/AIA X-ray image at 91 Å and Bharat Radiation images at 131, 193, 211 and 304 Å in Figures 4 to 7. Interestingly, Figure 8 reveals solar flares seen in SDO/AIA Bharat Radiation image at 304A are absent in UV images at 1600 Å, and 1700 Å and visible light image at 4500 Å mainly due to significant absorption of UV and visible light in the space between Sun and the detector. This can be understood from Figure 9.



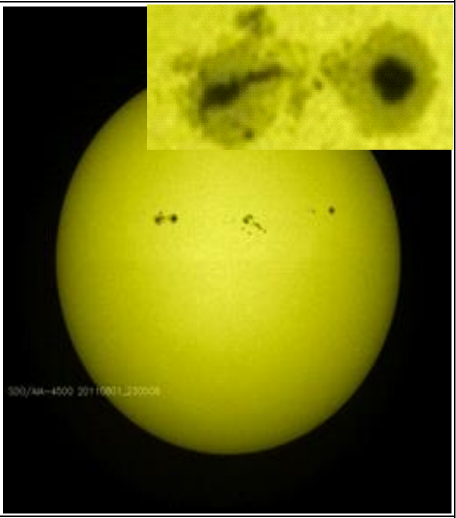
Sun's dark spots in Bharat Radiation image of Sun at 304A reported by Michael Rundle [26].



Sun's dark spots in enlarged SDO/AIA UV image of Sun at 1600 Å on 1 August 2011



Sun's dark spots in enlarged SDO/AIA UV image of Sun at 1700 Å on 1 August 2011



Sun's dark spots in SDO/AIA visible light image of Sun at 4500 Å on 1 August 2011

Fig. 8. Enlarged images of the Sun. Top row, left: Sun's dark spots in Bharat Radiation image of Sun at 304A reported by Michael Rundle [26]. The rest are SDO/AIA images of the Sun recorded on 1 August 2011. Top row, right: Sun's dark spots in UV image at 1600Å. Bottom row, left: Sun's dark spots in UV image at 1700Å. Bottom row, right: Dark Sun spots in visible light image at 4500 Å. Insert : An enlarged view of the two Sun spots at the extreme left in visible light image at 4500 Å.

Fig.8 shows Sun's dark spots in the SDO/AIA Bharat Radiation image at 304A, in enlarged UV images of Sun at 1600A and 1700A, and visible light image at 4500A. Dark Sun spots are clearly seen at 1600 and 1700 Å because of the surrounding bright tiny UV sources looking like rings or chemical structures. The pointed sources might be deposits of nuclear fallout comprising of long lived fission products like ^{137}Cs and ^{90}Sr into some cracks developed on Sun's surface surrounding the dark fission sites. Although UV intensity of pointed sources such as ^{137}Cs was reported to be as high as 96.64% in gross light intensity, most UV would be absorbed in the space between Sun and the detector [10]. Ring like tiny bright areas seen at UV are totally absent in visible light image at 4500 Å, which shows a dim visible light throughout Sun's disk. It is because % visible and near infrared radiation intensities from sources such as ^{137}Cs remain just at 3.22% and 0.14% respectively. Significant absorption of visible light in the space between Sun and the detector was the reason why Sun's disk appears very dim in visible light image at 4500A. Sun's dark spots are not seen at X-ray and EUV probably because solar flare generally masks the dark spots at these wavelengths. Sun's dark spots seem to form when uranium fission lifts away a large chunk of Sun's core material along with fission fragments into nuclear fallout. A large crater formed at the site of fission appears as Sun's dark spot since no emission takes place from the site, while the remaining Sun's disk show very low intensity at Bharat Radiation, UV and visible light wavelengths.

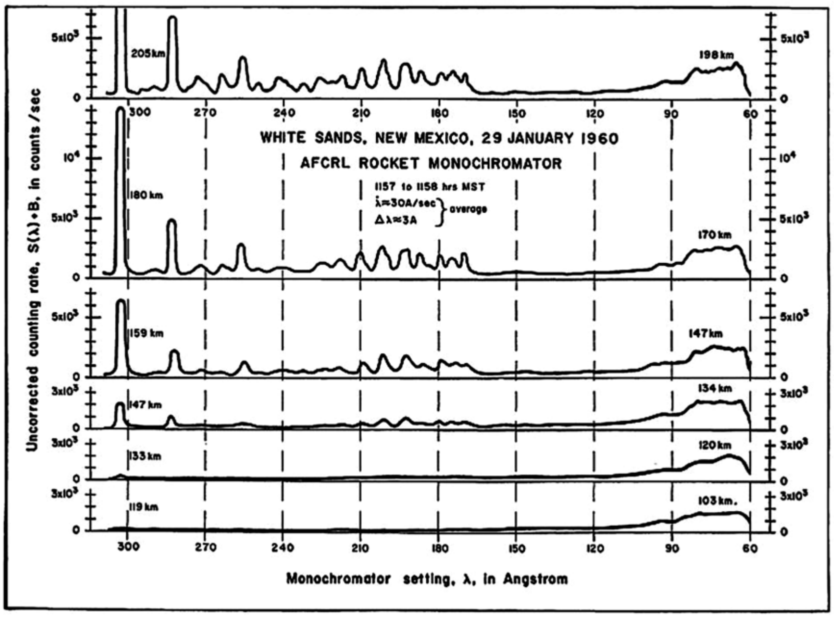


Fig. 9. Solar spectra measured by Hinteregger et al. at 103, 120, 134, 147, 170 and 198 km heights over New Mexico on 29 January 1960 [3]. The broad peak on the right side slowly fallen to base level somewhere at 128.7 A represents X-rays [1]. The wavelengths from 128.7 A to 304A represent Bharat Radiation.

2.19 Absorption of X-rays and Bharat Radiation in space

Fig.9 demonstrates absorption of X-rays and Bharat Radiation in the upper atmospheres of the Earth. Solar X-rays could be detected well up to 103 km height. In contrast, Bharat Radiation at longer wavelengths could be detected only up to 134 km. From this data it is understandable why there has been a fall in intensity of 335A EUV spectral band in Figs 4 to 7 and why the image at 335 Å showed a uniform fall in brightness as compared to images at 94 and 131 Å. Relatively more absorption of UV in space seemed to be the main cause why UV images at 1600 and 1700 Å failed to display the solar flare. Because of longer wavelengths, absorption of visible light in solar atmosphere has been the maximum, adding one more problem to the low intensity emission from radioisotopes. The UV and visible light images of the Sun provided a valuable information, though the spectral bands in Figs 4 to 7 did not include spectral bands at UV (1600 Å, and 1700 Å) and visible light (4500 Å).

2.20 Discovery of dark matter on Sun's surface

There are two reasons to believe that Sun's dark spots might provide the first evidence on true existence of the familiar dark matter. (i) The biggest Sun spots estimated to be almost six times to the size of Earth [26] coincides with the general opinion that sizable fraction of the Universe constitutes Dark Matter [27, 28]. (ii) It is also believed that dark matter doesn't release light [28]. In support of this view, images of Sun in Fig. 8 have provided evidence that Sun's dark spots do not emit Bharat radiation, UV and visible light. Pasquale Dario Serpico and Dan Hooper reviewed prospects for the Fermi satellite (formerly known as GLAST) to detect gamma rays from dark matter [29]. However, this seems to be not possible since fission products would be thrown out from the site during fission reaction, so the site appears as Sun's dark spot in the absence of any known radiation emission. Therefore, immediately after fission, the Sun's core material in the crater formed at the site of fission devoid of any emission might be the familiar dark Matter.

2.21 A typical Phenomenon in solar flare

As the fission products in fallout remain as radioisotopic ions, they exhibit peculiar behavior. Very surprisingly, the solar flares from site 1 and 2 were attracted each other towards their centre, while no spread of solar flares on the right side of site 1 and left side of site 2 in Fig.8 top left. This is because excited atoms in fission products which remain in highly ionized state in solar atmosphere seem to exhibit a phenomenon of mutual attraction. That is why these two fallouts (solar flares) formed a cloud of radioisotopic ions in the SDO/AIA image at 304A. Typically radioactive cloud was able to travel hundreds of kilometers after Chernobyl accident.

2.22 Sources of Sunlight to Earth

Visible light image of the Sun at 4500°A in Fig. 8 show Sun's very poor visible light emission that cannot account the abundant Sun light that Earth receives every day. On the other hand SDO/AIA Bharat radiation images of Sun at 193 and 211A in Figs 4 to 7 show abundant Bharat Radiation at the periphery of Sun's disk indicating escape of most Bharat radiation into solar atmosphere. Particularly, by virtue of high release of radioactivity of ^{131}I during Uranium fission, Table 2 disclose the Bharat Radiation intensity of 171 Å in solar atmosphere attained maximum over all other wavelengths measured at different spectral bands in Figs. 4 to 7. ^{131}I emits β, γ, and Xe X-rays at different energies; therefore some of these energies not shown in Table 1 also might be causing different Bharat Radiation wavelengths. This is the case with all other radioisotopes listed in Table 1. Bharat Radiation can also be caused by the following mechanisms. The high flux of γ energies resulted in fission can knock out core electrons resulting into X-rays, which cause Bharat Radiation, in turn the EUV and UV dominant optical emissions. When most core electrons are knocked away from excited atom leaving behind only one filled K-shell, the β, or γ emission can exclusively cause Bharat Radiation from K-shell but Bharat Radiation cannot cause optical emission from L shell in the absence of core electron as happens in the case of tritium, ^{3}H [10]. Bharat Radiation might be generating EUV intensity up to 130 km above Earth's surface but its absorption in Earth's atmosphere is very likely. This raises a doubt that all the intense bright light what Earth receives everyday may not be directly from the Sun.

Table 2. Intensities of 94 Å X-rays, Bharat Radiation at 131, 171, 211, and 304 Å, and EUV at 335Å shown on Y axis in AIA spectral bands on three different days disclose maximum intensity is from 171A Bharat Radiation emission due to presence of fission product ^{131}I in solar flares..

solar spectrum at	01-Nov-11 Intensity range	30-Jan-12 (Fig.7) Intensity range	6-Mar-12 (Fig.4) Intensity range
94 Å	1.1e+00 - 1.3e+00	7.8 e-01 - 8.5 e-01	8.2e-01 – 6.5e+00
131 Å	4.3e+00 - 4.8 e+00	3.4 e+00 - 3.5 e+00	3.3e+00 – 3.6e+01
171 Å	1.4e+02 - 1.4e+02	1.1 e+02 - 1.1 e+02	9.8e+01 – 1.3e+02
211 Å	6.8e+01 – 7.1e+01	5.7 e+01 - 5.8 e+01	5.1e+01 – 6.1e+01
304 Å	1.0e+01 – 1.1e+01	3.4 e+00 - 3.5 e+00	9.5e+00 – 1.7e+01
335 Å	3.6e+00 – 3.9e+00	2.4 e+00 - 2.6 e+00	2.2e+00 – 4.2e+00

2.23 Radiations responsible for Sunlight.

Very low intensity seen throughout Sun's disk in visible light image of Sun UV in Figure 8 does not account the bright Sunlight received on Earth.

Sun's Bharat Radiation can be detected above 130 km height from the Earth's surface as can be evident from Fig.9. Therefore, up to 130 km height Sun's Bharat Radiation might be causing EUV, UV, visible, near infrared and infrared radiations by valence excitation in radioisotopic ion cloud going towards Earth. However, there is a possibility much of EUV, UV, visible, near infrared and infrared radiations produced thus to be absorbed in space before reaching Earth. For example, infrared can be observed at high altitudes but cannot reach surface of the Earth due to absorption [34].

Most importantly, the fission fragments and their energetic β, γ and X-ray emissions can penetrate Earth's atmosphere within 130 km height and reach very close to the Earth's surface and contribute to most Sunlight. This new study unfolds that cosmic rays constitute mostly the ionizing radiations arising from uranium fission on Sun's surface. Solar γ, β, or X-ray generate Bharat radiation that in turn causes EUV, UV, visible, near infrared and infrared radiations within the excited atoms of fission products arrived into Earth's atmosphere. Northern lights is a clear example to this. Moreover, the EUV also may degrade into UV, visible, near infrared and infrared radiations in the Earth's atmosphere. There is a reason why uranium fission is able to provide abundant Sunlight to the Earth. The amount of uranium involved for fission reaction is comparable to the size of Earth that can be understood from a large sized Sun's dark spot in Fig.8. In nutshell, the source to the most Sun light is the Bharat Radiation produced within 130 km above Earth's atmosphere by penetrating Sun's β, γ and X-ray emissions.

Earth's magnetism also seems to play a key role in the distribution of Sunlight. Along with γ, β, or X-ray low wavelength Bharat radiation seems to reach Earth and more towards North and South poles. As a result areas close to North and South poles receive abundant UV while tropical countries or regions receive more of visible, near infrared, and infrared radiations.

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