



भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद Physical Research Laboratory, Ahmedabad

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60_PRL Ka Amrut Vyakhyaan

Wednesday, 21 September 2022

@ 04:00 PM (IST)

“Threat of the Sun and Superflares”

Prof. Kazunari Shibata

**Emeritus Professor, Kyoto University, and
Distinguished Visiting Professor, Doshisha University.**



<https://youtu.be/KexDQfZuS8U>



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Title: “Threat of the Sun and Superflares”

Speaker: Prof. Kazunari Shibata

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Abstract

Recent development of space and ground-based observations of the Sun revealed that the solar corona and chromosphere are much more dynamic than had been thought, and are full of explosions such as flares, jets, and coronal mass ejections (CMEs). It has also been found that such vigorous activity of the Sun often led to disasters or troubles in modern society on the Earth, e.g., radio communication failure, blackout of the city, malfunction of artificial satellites, and so on. There is a possibility that astronauts may have radiation sickness because of strong radiation particles from solar flares. Hence the “space weather prediction” is an urgent issue for human beings especially for future space business and space travel. On the other hand, recent observations of Sun-like stars revealed occurrence of superflares (with energy 10 times more than the largest flares, i.e., 10^{33} - 4×10^{34} erg) with frequency once per a few 100 - a few 1000 years. In this talk, the speaker will introduce recent development of solar and stellar research on these subjects, and finally discuss the following questions:

Can superflares occur on the Sun? If superflares occur on the Sun, what would happen in our modern society ?

The Speaker

Prof. Kazunari Shibata, is currently an Emeritus Professor at Kyoto University. He is also a Distinguished Visiting Professor at Doshisha University in Japan. Prof. Shibata received Bachelor of Science in Astrophysics at Kyoto University in 1977 and then Master of Science in Astrophysics at Kyoto University in 1979. In 1983, he did his Ph. D. in Astrophysics at Kyoto University. Later, he served as Research Associate at Aichi University of Education and in 1986 he was appointed as the Associate Professor at Aichi University of Education. In 1991, Prof. Shibata joined the National Astronomical Observatory of Japan as an Associate Professor and in 1999 became a Professor at Kwasan and Hida Observatories, Kyoto University. He was the Director of Kwasan and Hida Observatories, Kyoto University from 2004-2019.

Prof. Shibata began his scientific career with research focussing on AGN and later moved to Solar Physics, where he made significant contributions to the studies on jets and solar flares. Prof. Shibata has played a key role in the Japanese Yohkoh and Hinode solar missions. Through his research contributions, Professor Shibata has also played a leading role in international research on the space weather forecasting system. Prof. Shibata is a recipient of 2001 Chushiro Hayashi Prize of the Astronomical Society of Japan, 2019, Chandrasekhar Prize of the Association of Asia Pacific Physical Societies, Division of Plasma Physics (AAPPS-DPP) and the 2020 Hale Prize from Solar Physics Division of American Astronomical Society for his outstanding work on the properties and behavior of magnetized solar and astrophysical plasmas. Prof. Shibata was the Vice President of the Astronomical Society of Japan during 2009-2010 and served as the President during 2017-2019.



About PRL

The Physical Research Laboratory (PRL), known as the “cradle of space science” in India, is one



of the premier research institutes founded in 1947 by Prof. Vikram Sarabhai, a renowned Cosmic Ray Scientist, a great visionary and institution builder. PRL played a seminal role in producing a highly motivated cadre of space scientists and the technologists of highest international repute. The first scientific rocket launched from Thumba on 21st November-1963 and many other rockets launched thereafter contained payloads developed at PRL. Dr. Sarabhai initiated many of these scientific and technical activities at PRL which eventually led to the formation of the Indian Space Research Organization (ISRO). Therefore, PRL is known as the “cradle of space science” in India. Further, the research in the area

of Plasma Physics expanded to the formation of the Institute of Plasma Research (IPR).

As an institution PRL is unique in that it conducts fundamental research in a wide range of research areas from the Earth to the cosmos, and comprising Astronomy and Astrophysics; Solar Physics; Space and Atmospheric Sciences; Theoretical Physics; Geosciences; Atomic, Molecular and Optical Physics, Astrochemistry; and Planetary Sciences and Space Exploration. PRL is one of the rare research institutes of international repute wherein research in such diverse fields of sciences is carried out using several state-of-the-art experimental facilities that exist under one umbrella.

Along with the ongoing research, several new initiatives have been taken up during the last few years. The Multi-Application Solar Telescope (MAST) at Udaipur Solar Observatory has been operationalized. PRL initiated scientific programmes in frontier areas of research, which include a search for exo-planets, laboratory studies of interstellar grains, laboratory synthesis of cold astro-molecules and experimental studies in the field of quantum optics. PRL is also developing several scientific payloads as a part of ISRO’s larger vision and contributing to roadmap for competitive scientific exploration of the solar system and beyond. In particular, PRL has been contributing significantly not only in building instruments for space missions, such as Chandrayaan-1, Chandrayaan-2, AstroSat and upcoming Aditya-L1, Chandrayaan-3 and planetary and space missions, but also by bringing out new and insightful science results.

PRL contributes to several national and international research programmes and to human resource development through its Doctoral and Post-Doctoral Programmes, capacity building programmes, such as UN Course on Space Science, and science and engineering internship programmes. PRL contributes significantly to society through its Outreach Programmes by periodically organizing science exhibitions and Open Houses, planned visits of students of various school and college to PRL, and popular talks at various institutions to not only share the excitements of the advancements of contemporary scientific findings but also to encourage students to take up sciences as their research career.

