Report on PRoject for OnBoard Autonomy (PROBA)-3 Science Working Team Meeting

To advance the understating of solar physics, scientists from various parts of the globe travel the world to position themselves for a brief glimpse of the Sun's corona lasting just a few minutes at a time during total solar eclipses. However, information gathered during natural solar eclipses is rare and insufficient to fulfil the curiosity regarding the evolution of the sun and hence the planetary system including the Earth's climate driven primarily by solar energy. Realising it, Scientists from the European Space Agency (ESA) conceptualised to create 'solar eclipses on demand' through a new cutting-edge technology applied to the PROBA-3 mission. PROBA stands for PRoject for OnBoard Autonomy which is among the smallest and most advanced spacecraft ever to be flown by ESA. The PROBA-3 mission is a technology demonstration mission of the ESA which will demonstrate innovative techniques and technologies of formation flying, but also obtain images of the solar corona for scientific research. The mission consists of two spacecraft flying in precise formation to create a giant solar coronagraph: one spacecraft will host the telescope, and the other will carry a circular occulter to create a shadow like during a total solar eclipse. During such "eclipses on demand" PROBA-3 will obtain images of the corona of the Sun, which will be crucial for solar physics. This mission was launched using PSLV-XL from Satish Dhawan Space Centre (SDSC), SHAR, India on December 5, 2024. After the launch, the science working team meeting as well as interaction meeting for faculty members and students of SRM Institute of Science and Technology (SRMIST), Kattankulathur conducted from 5-6 December 2024.

This event is conducted at the Centre for Atmospheric Sciences and Climate Studies, SRMIST in collaboration with the ESA, the Indian Space Research Organization (ISRO) and the Indian Institute of Space Science and Technology (IIST). Around 50 European scientists along with their family members as well as twenty scientists from ISRO witnessed the launch of PROBA-3 at SDSC SHAR and took part in the SWT meeting at SRMIST. A formal inauguration ceremony of PAROBA-3 SWT was held in the presence of chief guests **J. Zender**, PROBA-3 Project Scientist from ESA, and Prof. Dipankar Banerjee from IIST, along with the eminent scientists and professors who have significantly contributed to space exploration. It includes the lighting of *Kuthuvilakku* (Inauguration Lamp), a welcome address by **C. Muthamizhchelvan** (SRMIST) mentioning that the event being conducted in an academic institution will kindle a lot of interest

among the faculty and the students to pursue a career in space research. **Dipankar Banerjee** (IIST) addressed the gathering on behalf of S. Somanath (Chairman of ISRO) and highlighted the ISRO chairman's longstanding commitment to engage with students and the public. He further stressed that there have been more than 200 startups of space companies registered officially with ISRO indicating a big change for youngsters involving not only the government sector but also the private sector for the space programs. An overview of the European Space Agency is presented by **J. Zender** (ESA). He specified his close-knit connection with the ISRO chairman for the PROBA-3 launch from SDSC SHAR and further presented an overview of ESA by showing a news clipping that read "What India is accomplishing in space is astonishing; the ESA director praises ISRO". He also gave a view of how the funding process for space organization happens for ESA and pointed out how it was different from that of India. He further mentioned that ESA is committed to peaceful exploration and use of space for the benefit of people, society and the planet. The main headquarters of ESA is located in Paris which steer and formulate ESA policy. ESA also supports the Earth observation activities located in Rome, Italy as well as also develops information systems and hosts the VEGA Launcher project. The European Space Technology Centre located in Noordwijk Netherlands and the European Astronaut Centre located in Cologne, Germany trains astronauts for missions to the international space station and beyond. Finally, **Sanjay Kumar Mehta** (SRMIST) presented the vote of thanks mentioning that it is an important part of any event done as a team to thank and pay gratitude to everyone. He also mentioned that all the dots need to be connected well for a successful event. Faculty members and students of SRM institutions engaged in a vibrant science interaction meeting with ESA and European scientists. This session provided a platform for academic discussions and potential research collaborations. More than 50 faculty members and students from Atmospheric Sciences, Physics, Aerospace engineering, computer science, electronics and communication took part in the interaction meeting. The questions and comments are addressed by the panel of members **Joe Zender, Andrei Zhukov, Wolfgang Finsterle, Deepankar Banerjee and K. Sankarasubramanian**. The interaction meeting is moderated by Sanjay Kumar Mehta. Important questions were who conceptualized the idea for the PROBA-3 mission? What is the next plan after the PROBA-3 mission? How budget of the PROBA-3 mission achieved? Why the separation between two satellites ~ 150 m is selected? Why so many space missions causing space debris? Why launch of PROBA-3 mission is planned from ISRO? What are the possible of opportunities in space research? What are the roles of ESA

and ISRO in training the manpower in academic institutions? The responses to these questions were provided by the panel members. The event fostered interactions between Indian and European scientific communities, paving the way for future partnerships and advancements in space science.

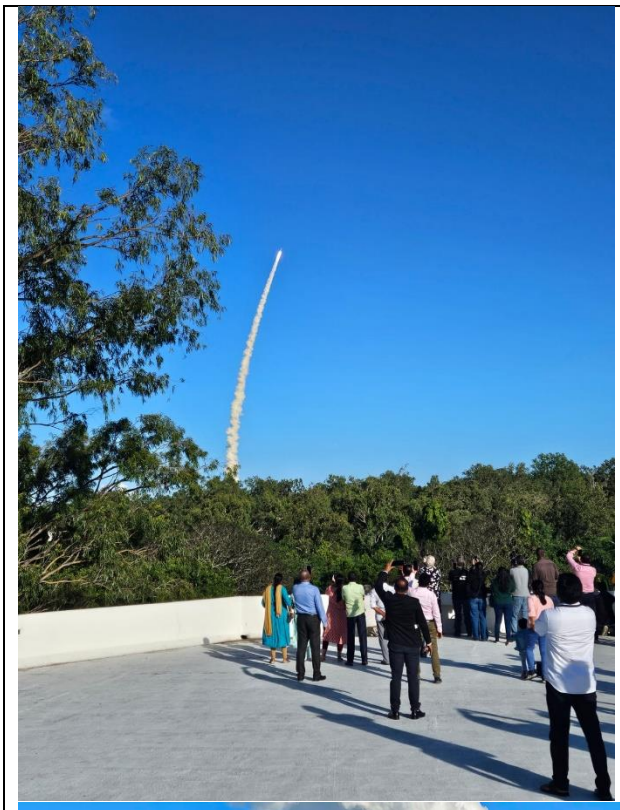

Figure: Launch of PROBA-3 Satellites using PSLV-XL from Satish Dhawan Space Centre (SDSC), SHAR, India on December 5, 2024. ESA Scientists and SRMIST students and faculty taking part in witnessing the launch.

Figure: Lighting *Kuthuvilakku* (Inauguration Lamp), Inaugural function of SWT meeting (left to right, John Thiruvadigal, Dipankar Banerjee, Joe Zender, C. Muthamizhchelvan, A. Zhukov, T.V. Gopal, and Sanjay Kumar Mehta), and Group photo of ESA and ISRO scientists present during the SWT meeting

Figure: Participants of PROBA3-SWT meeting and felicitation of Joe Zender by C. Muthamizhchelvan (Vice Chancellor, SRMIST)

Figure: Interaction meeting and group photo of local organizing members with ESA Scientists

Acknowledgments
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Additional information For SWT reports

o Dates and place (meeting location)
Date: 05-06 December 2024
Place: SRM Institute of Science and Technology, Chennai, India
o Name(s) of organizer(s), affiliation(s)
Dr. Andrei Zhukov , *ROB, Belgium*
Prof. Dipankar Banerjee, *IIST, India*
Dr. Sanjay Kumar Mehta, SRM Institute of Science and Technology

Local Organising Committee:
Dr. E. Senthilkumar, Prof. P. Malar, Prof. Venkata Prasad Bhat, Dr Arijit Sen, Dr. Kiran Mangapalli, Dr. A. Nagarajesh, Dr. Rohit Dhir, Dr. Chandramohan, Dr. Debabrata Sarkar, Dr. Jaivardhan Sinha, *and* Dr. Rohit Chakravorty
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Conference Webpage: https://www.srmist.edu.in/events/proba-3workshop-2024/