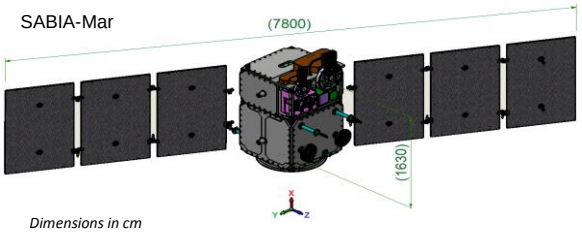
# Liulin-AR spectrometer for radiation environment observation on SABIA-MAR 1 Satellite

T. Dachev, Space Research and Technology Institute of Bulgarian Academy of Science, Sofia, Bulgaria
A. Zanini, Istituto Nazionale di Fisica Nucleare, Sez. Torino, Italy
M. Colazo, Comisión Nacional de Actividades Espaciales, Buenos Aires, Argentina
D. Caruso, Comisión Nacional de Actividades Espaciales, Buenos Aires, Argentina
M.Rabolli, Comisión Nacional de Actividades Espaciales, Buenos Aires, Argentina
V. Ciancio, Universitad National de La Plata, La Plata, Argentina

## Abstract

The SABIA-Mar (Satélite Argentino Brasileño para Información del Mar) is a dual satellite joint Argentine-Brazilian Earth observation mission, which objective is to study the oceanic biosphere, its changes along time and how it is affected and reacts to human activity. The Argentinian SABIA-Mar 1 satellite planned to be launched at 702 km sun-synchronous circular orbit in 2021. The platform and the instruments for ocean color observation and sea surface temperature determination are developed and built in Argentina. A Liulin instrument for determination and quantification of the global distribution of the 4 possible primary sources of space radiation outside the satellite: galactic cosmic rays particles and their secondary products, energetic protons in the South Atlantic Anomaly region of the inner radiation belt, relativistic electrons and/or bremsstrahlung in the outer radiation belt and solar energetic particles, generated during solar particles events. The Liulin-AR instrument is a Liulin-type deposited energy spectrometer, which weren successfully used in the period 2001-2016 in: five missions to the International space station, four low earth orbiting satellites and on the lunar Indian Chandrayaan-1 satellite. It is miniature spectrometer-dosimeter, which uses pulse analysis technique to obtain the energy deposited spectrum in single PIN diode with area of 2 $cm^2$ and thickness of 0.3 mm. The spectra are further used for calculation of the deposited in the silicon of the detector dose rate in micro Grey per hour and the flux of the particles. The Liulin -R dimensions are 10x40x20 mm and weight of 0.092 kg.




## Recent Publications

1. SABIA-MAR (2009) Phase A, final Report; CONAE Document SB-010400-IA-00100 , Release A:1-48
2. Rabolli M, Torrusio S, Caruso D, (2017) CONAE, SABIA-Mar Mission Status Update.
3. Dachev T, Semkova J, Tomov T, Nikolaev I, et al, (2015) Overview the Liulin type instruments for space radiation meaurement and their scientific results, Life sciences and Space Research 4:91-114
4. Dachev T, Tomov B, Matviichuk Y, Dimitrov P, Bankov N, Häder D,Horneck G, Reitz G,(2015) ISS radiation environment as observed by liulin type R3-DR2 instrument in October-November 2014. Aerospace Research in Bulgaria: 17-42
5. Semkova J, Koleva R, Bankov N, Malchev St, Petrov VM, Shurshakov VA, et al. (2013). Study of radiation conditions onboard the International Space Station by means of the Liulin-5 dosimeter. Cosmic Res.51:124– 132.
6. Damasso M, Dachev T, Falzetta G, Giardi M T, Rea G, Zanini A. (2009). The radiation environment observed by Liulin-Photo and R3D-B3 spectrum-dosimeters inside and outside Foton-M3 spacecraft. Radiation Measurements 44:263-273

Alba Zanini has her expertise in ionizing radiation dosimetry, both in medical and environmental field. In particular she developed original methods of passive dosimetry techniques for neutron spectrometry and dosimetry, suitable for space application, that were successfully employed on LEO orbits ESA satellites and on International Space Station. At present she collaborates with CONAE and IAA (Istituto Antartico Argentino) for a program of environmental radiatin dosimetry at high southern latitudes, in space and in Argentine Antarctic base Marambio

zanini@to.infn.it

**Notes/Comments:**

**Presenting author details**

Full name: Alba Zanini
Contact number: 0039 348 2244152
Mail id: zanini@to.infn.it

Category: ( Poster presentation)