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An electrostatic energy analyzer for the EQUARS scientific satellite to detect electron beams up to 40 keV

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Electron beams with energies below 50 keV are a common occurrence in the ionosphere, magnetosphere and interplanetary regions, where they have been detected by electrostatic energy analyzers (ESA) in many missions. The equatorial region has received much less attention in the past, so that the launching of the EQUARS satellite by INPE is a good opportunity to study these beams in this region. Two main scientific objectives are aimed: the first is related to the electron precipitation in the South Atlantic Magnetic anomaly (SAMA). Fluxes at SAMA are sufficiently strong to produce localized enhancements of ionization in the D and E regions of the ionosphere, and have been extensively studied by the CEA/INPE group using VLF techniques. A direct measurement of the electron beam by an ESA could corroborate these indirect evidences. Another scientific contribution would be the detection of electron beams in plasma bubbles, and studies of electron heating by wave-particle interactions developed in the Associated Plasma Laboratory. Heating of electrons in the equatorial plasma (plasma bubbles) and also at the SAMA has been detected by scientific, the heating mechanisms being still unknown. A collaboration with the Langmuir probe project IONEX of fluctuation measurements, could be relevant for the study of electron beam interaction with the equatorial plasma. The details of the construction of a prototype and the planned development for a space qualified instrument will be presented. Details of the calibration system and elimination of UV contamination will be also be presented.

Keywords: **EQUARS, electrostatic analyzer, electron precipitation, satellite**

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