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Design, Assessment, and Calibration of the Moon-Aiming Thai-Chinese Hodoscope for Observing Cosmic Ray Electrons, Solar Energetic Particles, and Lunar Albedo Ions

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The Moon-Aiming Thai-Chinese Hodoscope (MATCH) is designed as a space weather payload for the Chang'E-7 lunar orbiter, aimed at enhancing space weather monitoring in the Earth-Moon region and measuring lunar albedo ions up to approximately 100 MeV/n. Additionally, it will provide continuous measurements of cosmic ray electrons up to around 120 MeV/n, thereby clarifying the contributions from Jovian and Galactic sources. Furthermore, Jovian electrons, together with solar energetic particles (SEPs) to a certain degree, constitute particles from a recognized source that can be utilized to investigate the effects of Earth's magnetotail during a segment of the Moon's orbit around Earth. The engineering challenges for Thailand's nascent space program include integrated sensor design and fabrication, mechanical design, readout electronics with high resolution and sensitivity yet low power consumption and ensuring seamless integration with and safe operation of the Chang'E-7 orbiter spacecraft itself. This presentation will include the scientific objectives and technical design of the payload, validation via GEANT4 simulations of geometrical acceptance and angular resolution, along with the results from the detector payload's calibrations using standard radiation testing in a space environment control chamber. The expected detection range will also be confirmed.

Collaboration(s)

Author: Dr PUPRASIT, Kunlanan (Mahidol University, Bangkok, Thailand and Chulabhorn Royal Academy, Bangkok, Thailand)

Co-authors: Prof. RUFFOLO, David (Mahidol University, Bangkok, Thailand); ZHAO, Haojiang (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun, China); Ms LAKRONWAT, Jidapa (Mahidol University, Bangkok, Thailand); Mr AMRATISHA, Koth (Mahidol University, Bangkok, Thailand); Dr CHAIWONGKHOT, Kullapha (Mahidol University, Bangkok, Thailand); ZHANG, Ning (Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun, China); Mr KHONSRI, Pakorn (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand); Dr JAMLONGKUL, Paporin (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand); Dr TORTEEKA, Peerapong (National Astronomical Research Institute of Thailand, Chiangmai, Thailand); PATTARAKIJWANICH, Petchara (Mahidol University, Bangkok, Thailand); Mr CHAROENVICHA, Popefa (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand); Mr MANUTHASNA, Shariff (National Astronomical Research Institute of Thailand, Chiangmai, Thailand); ZHANG, Shenyi (National Space Sciences Center, Chinese Academy of Sciences, Beijing, China); Ms BUROM, Sunruthai (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand); Mr MARSRI, Tanawish (National Astronomical Research Institute of Thailand, Chiangmai, Thailand); PANYALERT, Thanayuth (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand); MITTHUMSIRI, Warit (Mahidol University, Bangkok, Thailand); HE, Xu (Changchun Institute of Optics, Fine Mechanics and Physics, Chi-

nese Academy of Sciences, Changchun, China); PITTAYANG, Yaowarat (National Astronomical Research Institute of Thailand, Chiang Mai, Thailand)

Presenter: Dr PUPRASIT, Kunlanan (Mahidol University, Bangkok, Thailand and Chulabhorn Royal Academy, Bangkok, Thailand)

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