Paper ID: 89846
oral
student

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

Author: Mr. Isaac Sarnoff
New York University Abu Dhabi, United Arab Emirates

Ms. Maryam Manzoor Amanullah
New York University Abu Dhabi, United Arab Emirates
Mr. Hamad Shams
New York University Abu Dhabi, United Arab Emirates
Mr. Tengiz Ibrayev
New York University Abu Dhabi, United Arab Emirates
Ms. Arwa Alabbasi
New York University Abu Dhabi, United Arab Emirates
Mr. Artem Knyazev
New York University Abu Dhabi, United Arab Emirates
Mr. Panagiotis Oikonomou
New York University Abu Dhabi, United Arab Emirates
Dr. Laura Manenti
New York University Abu Dhabi, United Arab Emirates
Ms. Hessa Almatroushi
Mohammed Bin Rashid Space Centre (MBRSC), United Arab Emirates
Dr. Zach Ioannou
Sultan Qaboos University (SQU), Oman
Ms. Reem Almehisni
Mohammed Bin Rashid Space Centre (MBRSC), United Arab Emirates
Dr. Sebastian Els
Mohammed Bin Rashid Space Centre (MBRSC), United Arab Emirates
Prof. Francesco Arneodo
New York University Abu Dhabi, United Arab Emirates

AN X-RAY SPECTROMETER FOR IN-SITU ANALYSIS OF SOLID ASTRONOMICAL BODIES.

Abstract

Alpha particle X-ray spectrometers (APXSs) have been one of the primary methods for determining the elemental composition of solid astronomical bodies in-situ. These detectors function by bombarding the target surface with high energy alpha particles and X-rays which excite nuclear states in the target material. These reemit characteristic X-rays which can be measured to determine the elements in the target. This type of detector has been a major feature of many lunar, Martian, and asteroid missions.

APXSs have been able to detect light elements, such as oxygen, because they use Curium 244 as the source for alphas. These particles excite low energy elements, leading to large amounts of low energy X-rays which can then be detected by X-ray sensors, like Silicon Drift Detectors (SDDs).

Yet new developments in SDD windowing technology may render Curium 244 unnecessary to this type of sensor. New silicon nitride and aluminum-based windows for SDDs allow much higher rates of low energy X-rays to be detected. This may allow the detection of light elements like oxygen using only X-ray

emitting sources which are more readily available, cheaper, and easier to handle, but cause less excitation of light elements' nuclear states.

At NYUAD, we are developing an APXS alternative designed to use X-ray only emitting sources while remaining sensitive to light elements.