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Cosmogenic and Interstellar Radionuclides in Lunar Soil

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The astrophysical site of the r-process remains an open question in nuclear astrophysics. Pure r-process radionuclides present in the solar system today that cannot originate from primordial events due to their comparably short half-lives (e.g. ^{244}Pu $t_{1/2}$ $\sim$ 81 Myr) act as fingerprints of recent r-process events in the solar neighbourhood. The discovery of live ^{244}Pu via single-atom counting with accelerator mass spectrometry (AMS) in deep-sea ferromanganese crusts has recently confirmed such r-process activity. We now aim to extend our search for interstellar ^{244}Pu and also supernova-produced ^{60}Fe ($t_{1/2}$ = 2.6 Myr) to a different archive, lunar soil, which allows to map out the interstellar influx up to hundreds of millions of years ago. The proper characterization of the soil's exposure history and composition is important here. Alongside various analytical methods we measure cosmogenic radionuclides with half-lives in the order of million years via AMS. ^{10}Be, ^{26}Al, and ^{41}Ca are measured at HZDR and ^{53}Mn at ANU.

This contribution presents initial findings from the measurements of these radionuclides in a set of lunar regolith samples, discussing their role in determining the sample's exposure history. Additionally, we will provide insights into preliminary ^{60}Fe data and updates on the quest for interstellar ^{244}Pu.

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