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The Legnaro fast-neutron facility NePIR

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NEPIR (Neutron and Proton Irradiation facility) is a project devoted to create a new irradiation facility at INFN Legnaro National Laboratories (LNL) in Italy. This contribution focuses on the most recent progresses of the project, that is in an advanced design phase and partially founded.

The facility will exploit the LNL 30-70 MeV, high current proton cyclotron of the SPES project to feed two different compact neutron sources in order to generate high flux neutron beams with different energy spectra. The first will produce a quasi mono-energetic neutron beam, with controllable energy peak in the 30-70 MeV range; the calculated flux at maximum energy and maximum current ($10 \mu\text{A}$, limited by radioprotection regulations) is $4.5 \times 10^5 \text{ n/cm}^2/\text{s}$, at a test point 3 m downstream. This versatile tool will be an important addition to the park of research infrastructures for national and European research.

The second converter, ANEM (Atmospheric Neutron EMulator) will produce fast ($E > 1 \text{ MeV}$) neutrons, with an energy distribution similar to that of neutrons naturally present at sea-level (atmospheric neutrons), generated by the interaction of energetic cosmic rays with the Earth atmosphere; the maximum expected flux, 4 m downstream of the source, is $3 \times 10^6 \text{ n/cm}^2/\text{s}$. This will be used to study atmospheric neutron-induced single event effects in electronic devices and systems. Using additional moderator panels, the ANEM white spectrum can be shaped to resemble that of other environments (eg. surface of Mars or moon).

In this talk, the facility overview will be presented, together with some scientific cases related to electronic device SEE testing and material characterization for Mars and general space missions.

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