

New Measurement of the $^{27}\text{Al}(p,\alpha)^{24}\text{Mg}$ and $^{27}\text{Al}(p,\gamma)^{28}\text{Si}$ reaction cross section at LUNA

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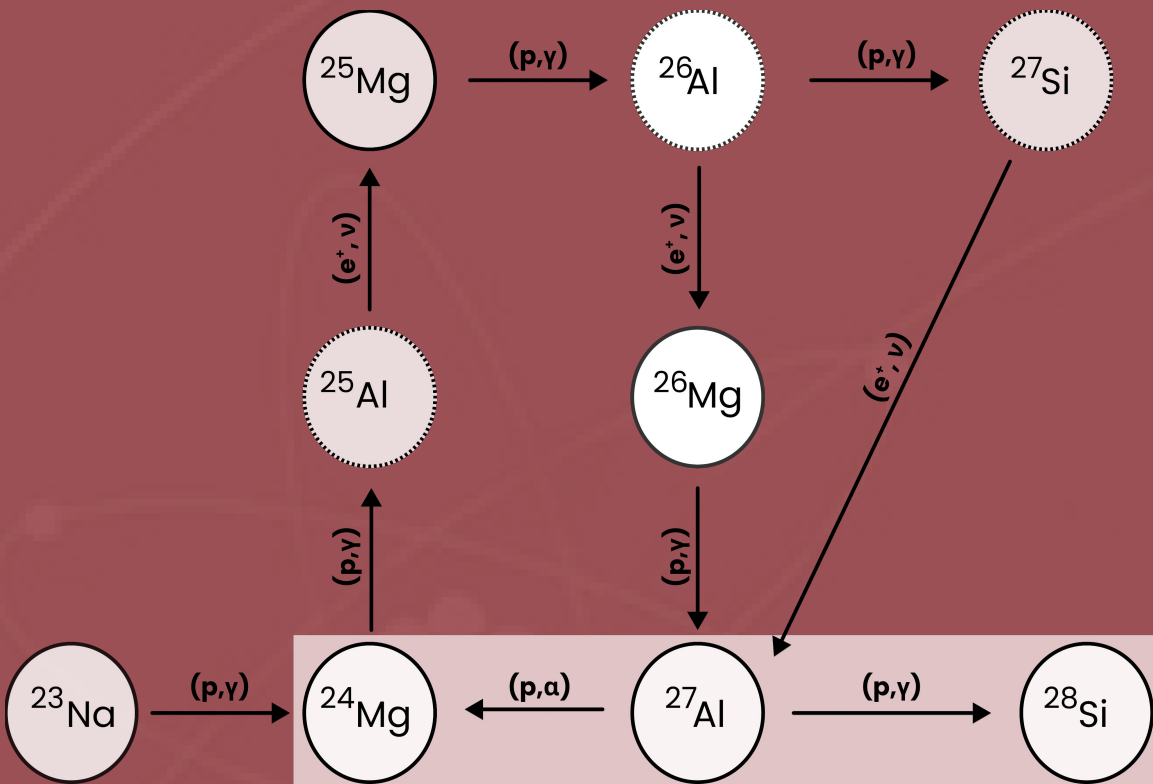
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41



Does ^{27}Al recycle back to Mg or leak toward Si?

MgAl branching point

The competition between the two exit channels controls cycle closure and leakage to heavier nuclei.

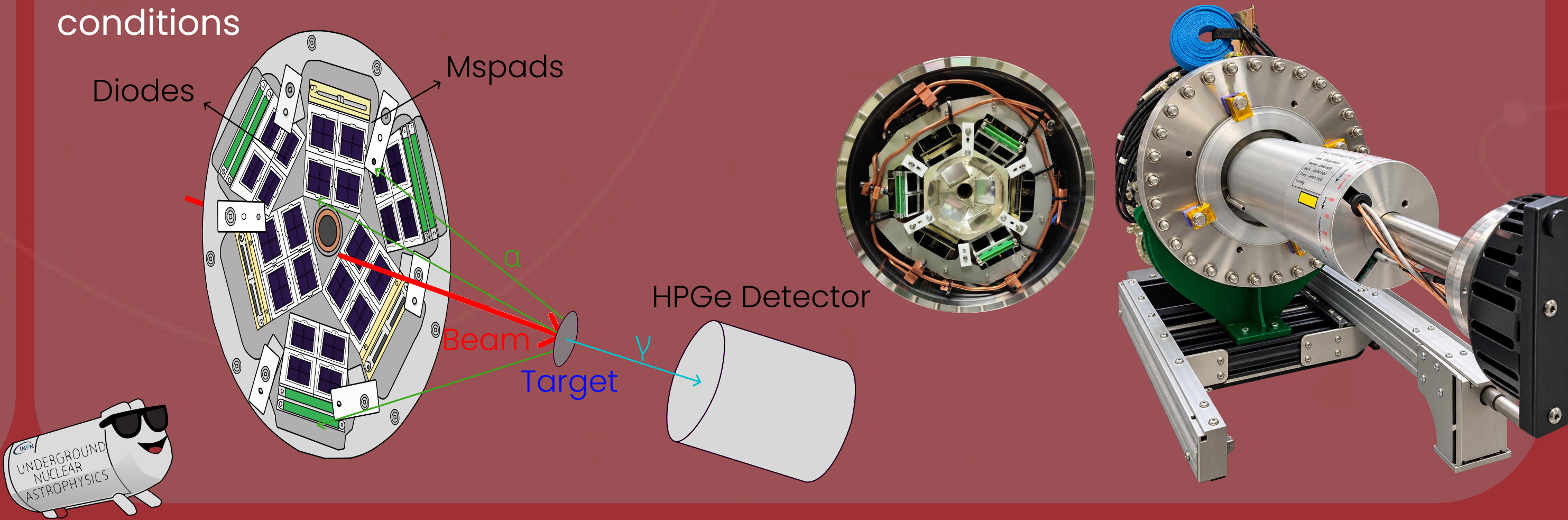


$^{27}\text{Al} \longrightarrow ^{24}\text{Mg}$
Cycle closure

$^{27}\text{Al} \longrightarrow ^{28}\text{Si}$
Leakage

LUNA 400 kV: one target, both channels

Direct study of four low-energy resonances under the same beam and target conditions



First sensitivity test

(p,γ) Clear signals of all four investigated resonances
 $E_R^{\text{cm}} \approx 193.8, 214.9, 282.3, 315 \text{ keV}$
Expected transitions identified

(p,α) Pushing the sensitivity to lower backgrounds
Current limit: ^{10}B background, detector noise and mylar energy loss