Charged-particle branching ratios of excited ^{19}F states and implications for ^{15}N and ^{18}O enrichment in presolar grains.

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Presolar grains with local enrichments of ^{15}N and ^{18}O such as those found in the Orguiel meteorite [1] potentially result from the helium-burning shell in core-collapse supernovae providing a signature for identification of the origin of these grains.
In the helium-burning shell, ^{18}F is produced by the ^{14}N$(\alpha,\gamma)^{18}$F reaction, subsequently decaying into ^{18}O. During the shockwave following the collapse the ^{18}O$(\alpha,n)^{21}$Ne reaction can begin to operate. The ^{18}F$(n,\alpha)^{15}$N and ^{18}F$(n,p)^{18}$O reactions can then be activated by the released neutrons. The strengths of these two competing reactions control the final production of ^{15}N and ^{18}O, and depend strongly on the behaviour of excited states in ^{19}F above the neutron threshold [2].
We report an indirect study of charged-particle decays resulting from above the neutron threshold in ^{19}F in order to better-constrain the ^{18}F$(n,\alpha)^{15}$N and ^{18}F$(n,p)^{18}$O reaction rates.

References

[1] Groopman, Bernatowicz, and Zinner, The Astrophysical Journal Letters **754**, L8 (2012)

[2] Bojazi and Meyer, Physical Review C **89**, 025807 (2014)