Nuclear physics of ^{26}Al production

E. T. Li[a,b], M. Lugaro[b], H. Brinkman[b], C. L. Doherty[b,c], B. Cote[b]

[a] *College of Physics & Energy, Shenzhen University, 518060, Shenzhen, China*
[b] *Konkoly Observatory, Hungarian Academy of Sciences, H-1121, Budapest, Hungary*
[c] *Monash Centre for Astrophysics, School of Physics and Astronomy, Monash University, Australia*

The ground state of the unstable ^{26}Al nucleus (^{26}Al^g) with $T_{1/2}$ = 0.717 Myr was the first radioisotope detected in the galaxy, via the characteristic 1.809 MeV γ-emission of ^{26}Mg [1]. The observation is direct proof of ongoing stellar nucleosynthesis in our Galaxy and indicates that there are approximately 2-3 $M_\odot$ of ^{26}Al^g [2]. It is therefore fundamental to understand the production of ^{26}Al^g and the effect of the nuclear physics uncertainty [3]. ^{26}Al has a isomeric state (^{26}Al^m) which is prohibited to decay into ^{26}Al^g due to the large spin difference (see Fig. 1). However, an equilibration between ^{26}Al^m and ^{26}Al^g could proceed via intermediate states and influence the abundance of ^{26}Al^g. Hence, the isomer could have an important influence on the production of ^{26}Al^g. To clarify the production mechanism of ^{26}Al^g in the winds of massive stars, we present our investigation of the sensitivity of the yields to variation of nuclear reaction rates involving ^{26}Al^g and ^{26}Al^m.

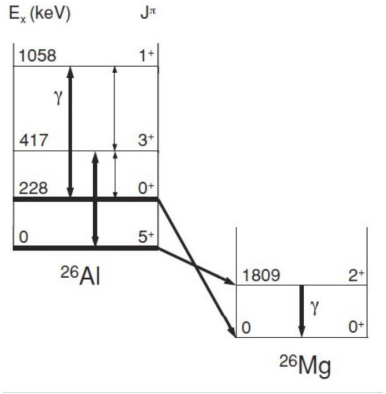

Figure 1: Level scheme of ^{26}Al and decay transitions.

References

[1] W. A. Mahoney et al., The Astrophys. J. 286(1984)578.

[2] R. Diehl et al., Nature 439(2006)45.

[3] C. Iliadis et al., The Astrophys. J. 193(2011)16.

[4] G. Audi et al., Chin. Phys. C, 41(2017)030001.