The $^{26}$Al yields in single stars

E. T. Li$^1$, M. Lugaro$^2$, H. E. Brinkman$^2$, C. L. Doherty$^2$, B. Côté$^2$

$^1$ College of Physics & Energy, Shenzhen University, 518060, Shenzhen, China
$^2$ Konkoly Observatory, Hungarian Academy of Sciences, H-1121, Budapest, Hungary
$^3$ 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 $\gamma$-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 yields of $^{26}$Al$_g$. $^{26}$Al has an isomeric state ($^{26}$Al$_m$) which is prohibited to decay into $^{26}$Al$_g$ due to the large spin difference. However, an equilibration between $^{26}$Al$_m$ and $^{26}$Al$_g$ could proceed via intermediate states and influence the abundance of $^{26}$Al$_g$ [3]. To clarify the production mechanism of $^{26}$Al$_g$, we present our investigation of the sensitivity of the yields to variation of nuclear reaction rates involving $^{26}$Al$_g$ and $^{26}$Al$_m$ in single stars.