Consequently a theoretical support is necessary, either because of the inadequacy of nuclear reaction cross sections close to the Gamow energy or because of the need for an accurate knowledge of the energy production in stars.

The calculation of the reaction rates relies on the cross sections. There are two main problems in nuclear astrophysics: (i) the stellar energies being much smaller than the Coulomb barrier, the relevant cross sections between charged particles are too small to be measured in the laboratory, (ii) explosive burning involves short-lived nuclei which, even if they can be produced with modern technologies, are available with weak intensities only.

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Global R-matrix analysis of the $^{3}He$ system

Key ingredient is the thermonuclear reaction rate

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Excellent characteristics for use in the determination of the tensor polarization of deuteron beams

MuCF provides a unique method to study these nuclear few-body reactions: in muonic molecules the two nuclei can be prepared in selected states of total spin $I$ and nuclear fusion occurs at extremely low collision energies. $^{3}He$($p$, $p'$)$^{4}He$(3.66 MeV) + p(14.64 MeV) + $^{3}He$

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Formation in collisions of slow atoms

The muonic atoms are produced by斯onne electrons in the reaction $\mu^{+} + D_{2}$, $D_{3}$ → (28 MeV) $\mu^{+} + D_{2}$, $D_{3}$, $\mu^{+} + T_{2}$, $T_{3}$ → (14 MeV) $\mu^{+} + D_{2}$, $D_{3}$, $\mu^{+} + D_{2}$, $D_{3}$, $\mu^{+} + D_{2}$, $D_{3}$.

Decay

$^{3}He$($p$, $p'$)$^{4}He$(3.66 MeV) + p(14.64 MeV) + $^{3}He$

Transitions

$^{3}He$($p$, $p'$)$^{4}He$(3.66 MeV) + p(14.64 MeV) + $^{3}He$

Results

$^{3}He$($p$, $p'$)$^{4}He$(3.66 MeV) + p(14.64 MeV) + $^{3}He$

Bibliography