

The reactions $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ and $^{12}\text{C}+^{12}\text{C}$ in direct experiments – Present status and perspectives

Monday

August 18

4 P.M.

Rm 124 NSH

Dr. Frank Strieder
Ruhr-Universität Bochum, Germany

The capture reaction $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ takes place in the helium burning of Red Giants and the $^{12}\text{C}+^{12}\text{C}$ fusion reactions are the main processes in carbon burning of massive stars. These reactions determine not only the nucleosynthesis of elements up to the iron region but also the subsequent evolution of massive stars, the dynamics of a supernova, and the kind of remnant after a supernova explosion. For these reasons, the cross section at the relevant astrophysical energy should be known with a precision of at least 10% for reliable models of late stellar evolution.

In spite of tremendous experimental efforts in measuring this cross section over nearly 40 years, one is still far from this goal. The available experimental data of these two important nuclear processes will be reviewed and open problems, questions, and ambiguities will be discussed. Finally, the prospects for new experiments will be outlined, with particular emphasis on the potentials and challenges of measurements at a future underground accelerator facility.

Refreshments served prior to the seminar in Rm 124.