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Studies of the $^{16}O(\gamma^*, \alpha)^{12}C$ reaction for astrophysical relevance at MAGIX/MESA STEFAN LUNKENHEIMER, Johannes Gutenberg University Mainz, MAGIX COLLABORATION — MAGIX is a versatile fixed-target experiment and will be operated at the new electron accelerator MESA (Mainz Energy-Recovering Superconducting Accelerator) in Mainz. The accelerator will deliver (un)polarized electron beams with currents up to 1 mA at 105 MeV. Using its internal gas-target, MAGIX will reach a luminosity of $\mathcal{O}(10^{35}\,\mathrm{cm}^{-2}\mathrm{s}^{-1})$. This allows to study processes with very low cross section at small momentum transfer in a rich physical program.

The nucleosynthesis process $^{12}C(\alpha, \gamma)^{16}O$ has a high astrophysical relevance. At MAGIX, an experiment is planned to determine the S-Factor of this reaction by measuring the inverse reaction $^{16}O(\gamma^*, \alpha)^{12}C$. Therefore electrons will be scattered inelastically on oxygen atoms, the scattered electrons and the produced α-particles are detected in coincidence. The cross section will be determined as a function of the outgoing center of mass energy of the carbon-α-system for the calculation of the S-factor. In this talk the experimental setup and the results of the current simulations are discussed. Furthermore, the accessible parameter range at MAGIX is specified.

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