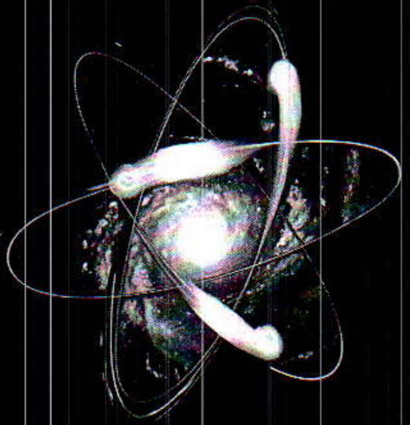
Abstract Book



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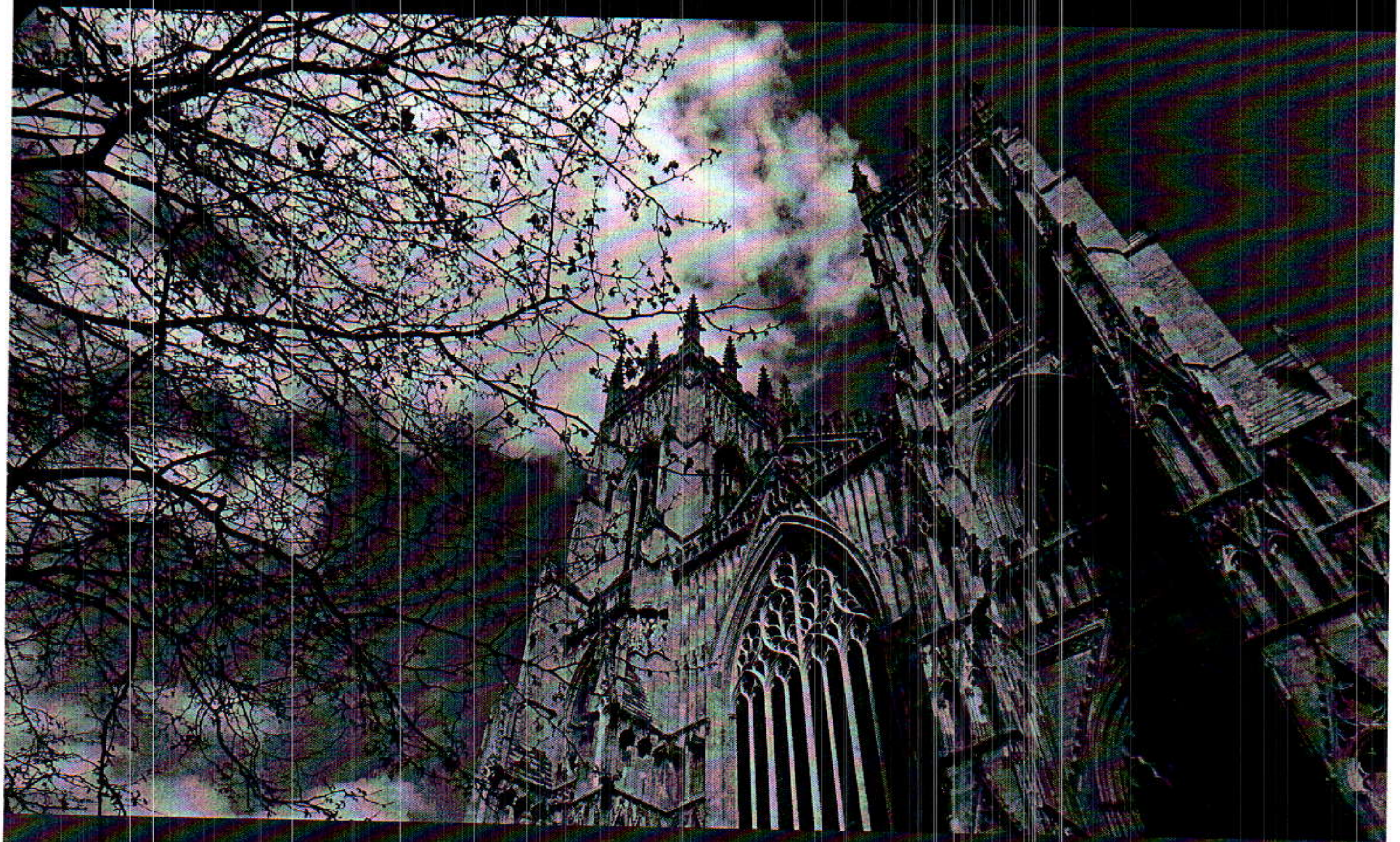

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P:36 Study of elastic and inelastic scattering of alpha particles from ^{11}B nuclei in the energy range of 29-54 MeV

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Study of nuclear reactions is of special interest as it could provide us with useful information about the nuclear structure, potential parameters, deformation parameters and transition probabilities. The α-nucleus interaction is an essential tool for the understanding of nuclear structure and nuclear reactions. The concept of the α-particle mean field has been widely used to unify the bound and scattering α-particle states in a similar way to use of the nuclear mean field to calculate the properties of bound single particle states and also the scattering of unbound nucleons by nuclei.

We have measured the angular distributions for the elastic and inelastic scattering of ^{4}He from ^{11}B in the isochronous cyclotron U-150 M INP RK. The extracted α-particles beam has been accelerated to energies 29 MeVand then directed to ^{11}B target of thickness ~32.9 μg/cm^2. The experimental results were analysed within the framework of both the optical model using different complex potential and the double folding potential obtained with different density-dependent NN interactions which give the corresponding values of the nuclear incompressibility K in the Hartree-Fock calculation of nuclear matter. The theoretical calculations for the concerned excited states were performed using the CC coupled channel method implemented in code FRESCO. We extracted the optimal deformation parameters for the $5/2^-$ and $7/2^-$ states.

In addition to our experimental data for $^{4}He+^{11}B$ at energy 29 MeV, we also analyzed the experimental data for this nuclear system at other energies (40 and 50 MeV) [1] and (48.7 and 54.1 MeV) [2].

[1] Burtebaev N., Baktybaev M. K., Duisebaev B. A., Peterson R. J., Sakuta S. B. Physics of Atomic Nuclei 68 (2005) 8

[2] Abele H., Hauser H. J., Körber A., Leitner W., Neu R., Plappert H., Rohwer T., Staudt G., Straßer M., Weite S., Walz M., Eversheim P. D., Hinterberger F., Zeitschrift für Physik A Atomic Nuclei 326 (1987) 4.

P:37 Role of nuclear reactions on stellar evolution of intermediate-mass stars

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The evolution of intermediate-mass stars (8 - 12 solar masses) rep- resents one of the most challenging subjects in nuclear astrophysics. Their final fate is highly uncertain and strongly model dependent. They can become white dwarfs, they can undergo electron-capture or core-collapse supernovae or they might even proceed towards explosive oxygen-burning and a subsequent thermonuclear explosion. We believe that an accurate description of nuclear reactions is crucial for the determination of the pre-supernova structure of these stars and show that weak rates involving sd-shell nuclei are of particular importance. We argue that due to the possible development of an oxygen-deflagration, a hydrodynamic description has to be used. We implement a nuclear reaction network with ~200 nuclear species into our implicit hydrodynamic code AGILE. The reaction network considers all relevant nu- clear electron captures and beta-decays. For selected relevant nuclear species, we include a set of updated reaction rates based on shell-model calculations, for which we discuss the role for the evolution of the stellar core, at the example of selected stellar models. We find that the final fate of these intermediate-mass stars depends sensitively on the density threshold for weak processes that deleptonize the stellar core.