THE STATISTICAL PROPERTIES OF ^{92}MO AND IMPLICATIONS FOR THE P-PROCESS

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A particularly challenging part of the question of how elements heavier than iron are created in extreme, astrophysical environments is the creation of the so-called p-nuclei, which are believed to be mainly produced in the O-Ne layer of type II supernovae or type Ia supernovae. The lack of needed nuclear data presents an obstacle in nailing down the precise site and astrophysical conditions for the production of these isotopes. Astrophysical model calculations are able to reproduce abundance patterns of most p-isotopes reasonably well, with some pivotal exceptions. In particular, p-isotopes of mass $92 \leq A \leq 98$ are underproduced in calculations compared to the actual abundance of these isotopes. The p-isotope ^{92}Mo represents one of the most severe cases of underproduction. State-of-the-art p-process calculations systematically underestimate the observed solar abundance of this isotope.

The main destruction mechanism of this isotope in the standard description of the p-process is through the ^{92}Mo($\boldsymbol{\gamma}$, p)^{91}Nb reaction. Measurements on the nuclear level density and average gamma strength function of ^{92}Mo have been carried out at the Oslo Cyclotron Laboratory. TALYS cross section and reaction rate calculations where the experimental results are used as input will be presented. The data provide stringent constraints on the ^{91}Nb(p, $\boldsymbol{\gamma}$)^{92}Mo (and consequently the inverse) reaction rate. The reaction rate extracted in this work was used in reaction network calculations for the scenario of a p-process taking place in a type II supernova explosion as the shock front passes through the O-Ne layer of a 25 solar mass star.