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Nova network calculations with shell model proton capture rates on A=34 nuclei

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Sulfur isotopic ratios have the potential to aid in the classification of presolar grains. Incomplete knowledge of the ^{34}S$(p,\gamma)^{35}$Cl and ^{34g,m}Cl$(p,\gamma)^{35}$Ar reaction rates leads to uncertainties in the production of ^{34}S in oxygen-neon classical nova models. Many proton resonances relevant for classical nova temperatures have a negative parity. In order to capture both positive and negative parity states, a full (0+1)$\hbar\omega$ model space was used for calculations of energies, spectroscopic factors, and proton decay widths as inputs for reaction rates. Probability distributions of these inputs were sampled using a Monte Carlo technique to determine uncertainties on the overall reaction rates. These reaction rates were then used in post processing nuclear network calculations using NucNet Tools to understand the impact on sulfur isotopic ratios in classical novae.

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