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 20 Ne $(p,\gamma){}^{21}$ Na Cross Sections and the Astrophysical Impact STEPHANIE LYONS, National Superconducting Cyclotron Laboratory, AN-DREAS BEST, Dipartmento di Scienze Fisiche, YING YING CHEN, RICHARD DEBOER, GWEN GILARDY, JOACHIM GOERRES, QIAN LIU, ALEX LONG, ZACH MEISEL, MIKE MORAN, DAN ROBERTSON, CHRIS SEYMOUR, ED STECH, BRYANT VAN DE KOLK, MICHAEL WIESCHER, University of Notre Dame — In stellar environments where T > 0.05 GK, hydrogen burning may proceed via the NeNa cycle. ${}^{20}Ne(p,\gamma){}^{21}Na$, the first reaction in the NeNa cycle, is thought to have the slowest reaction rate [1], thereby determine the timescale for the rest of the cycle. The stellar reaction rate for ${}^{20}Ne(p,\gamma)^{21}Na$ is dominated by direct capture and the high energy tail of a sub-threshold resonance, as shown previously [2]. Measurements of the 20 Ne $(p,\gamma)^{21}$ Na cross section from $E_p = 0.5-2.0$ MeV were performed at the University of Notre Dame Nuclear Science Laboratory using the St. ANA 5U accelerator and the Rhinoceros extended gas target. The cross sections were measured relative to the $E_{c.m.}=1113$ keV resonance, whose strength was independently measured. The measured cross sections were then analyzed using R-matrix. The extrapolated astrophysical S-factors, as well as reaction rates will be presented.

1. Iliadis et al. The Astrophysical Journal Supplement Series 134, 151 (2001).

2. Rolfs et al. Nuclear Physics A 241, 480 (1975).

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