Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

Studying the αp-process waiting points using Radioactive Ion Beams[1] C.M. DEIBEL, JINA/ANL, M. ALCORTA, P. BERTONE, J. CLARK, C.R. HOFFMAN, C.L. JIANG, B.P. KAY, H.Y. LEE, R. PARDO, K.E. REHM, A.M. ROGERS, ANL, J.M. FIGUEIRA, Laboratorio TANDAR, S. BEDOOR, D. SHETTY, A.H. WUOSMAA, WMU, J.C. LIGHTHALL, S.T. MARLEY, WMU/ANL, M. PAUL, Hebrew University, C. UGALDE, ANL/JINA/U. Chicago — The nucleosynthetic flow in type I X-ray Bursts (XRBs) is driven by the triple-α, rp and αp processes. Several intermediate mass nuclei, ^{22}Mg, ^{26}Si, ^{30}S, and ^{34}Ar, have been identified as possible candidates for waiting points in XRBs. When such a nucleus is reached, the flow stalls due to (p,γ)-(γ,p) equilibrium and must await β decay unless the (α,p) reaction is fast enough to break out of the waiting point first. A method to study these αp-process reactions has been developed whereby the time- inverse reaction is studied in inverse kinematics using radioactive ion beams produced by the in-flight method at the Argonne National Laboratory ATLAS facility. The reactions $p(^{29}\mathrm{P},^{26}\mathrm{Si})\alpha$, $p(^{33}\mathrm{Cl},^{30}\mathrm{S})\alpha$, and $p(^{37}\mathrm{K},^{34}\mathrm{Ar})\alpha$ have been studied to determine reaction rates for $^{26}\mathrm{Si}(\alpha,p)^{29}\mathrm{P}$, $^{30}\mathrm{S}(\alpha,p)^{33}\mathrm{Cl}$, and $^{34}\mathrm{Ar}(\alpha,p)^{37}\mathrm{K}$, respectively. The results and possible implications for nucleosynthesis in XRBs will be discussed.

[1]This work was supported under JINA NSF grant No. PHY0822648 and U.S. DOE contract DE-AC02-06CH11357.

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Date submitted: 06 Jul 2011 Electronic form version 1.4