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Sensitivity Study to Identify Important Nuclear Reactions in X-ray Burst Nucleosynthesis[1] BRITTNEY CONTRERAS, University of Tennessee, Knoxville — When neutron stars (NS) in a low mass x-ray binary system collect matter from their H or He rich companion star, nuclear burning can occur on the NS's surface. If a critical accretion rate is reached, nuclear reactions can runaway, resulting in X-Ray Bursts (XRBs). By studying the sensitivity of XRB models to different nuclear reactions, we can help identify which are key in the burst process. The stellar model used for this study was of an XRB in Modules for Experiments with Stellar Astrophysics (MESA). Python scripts were made to analyze the output data and compare it to the baseline model. Those with the greatest change identify key reactions to XRB nucleosynthesis. Preliminary results already indicate five reactions of significance. Additional dominant reactions will be identified with further runs. While in its early stage, the study has emphasized reactions that majorly affect XRB properties. Future work will expand on these current methods to calculate the primary metric "integrated burst variation" and compare it to baseline. As stellar modeling capabilities have improved, this work will be a crucial contribution to sensitivity studies performed in the past.

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Brittney Contreras
University of Tennessee, Knoxville

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