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Discovery of particle unstable ^{69}Br

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Two-proton capture on ^{68}Se through ^{69}Br provides a possible mechanism to bypass the waiting point at ^{68}Se during explosive hydrogen burning processes on neutron stars. This two-proton capture rate, however, depends exponentially on the ^{69}Br proton separation energy. We have determined the proton separation energy for ^{69}Br to be $-785+34-40$ keV by a direct measurement of the $p+^{68}\text{Se}$ decay products.^{1,2} This extracted value is less bound than that obtained from Coulomb displacement energy calculations and the known masses for ^{69}Se and ^{68}Se . The influence of our value for the proton separation energy for ^{69}Br on rp-process occurring in Type 1 X-ray bursts is examined in a one-zone burst model.

¹A M Rogers, W G Lynch, M A Famiano, M S Wallace, F Amorini, D Bazin, R J Charity, F Delaunay, R T de Souza, J Elson, A Gade, D Galaviz, S Hudan, J Lee, S Lobostov, S Lukyanov, M Matos, M Mocko, M B Tsang, D Shapira, L G Sobotka, G Verde, arXiv:1009.2950.

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