Superconductivity in Sc, Y, Lu, and CaLi$_2$ under Extreme Pressures\(^1\) M. DEBESSAI, J.J. HAMLIN, A.K. GANGOPADHYAY, J.S. SCHILLING, Dept. Physics, Washington U, St. Louis, MO, USA, T. MATSUOKA, K. SHIMIZU, KYOKUGEN, Osaka U, Japan — Following the first experiments by Sizoo and Onnes in 1925 on Sn, studies of superconductivity under high pressures have made important contributions by furthering our understanding of this exotic state and creating many new and novel superconducting materials, including O, Si, Fe, I, and Cs. Indeed, the number of elemental superconductors across the periodic table has almost doubled through the application of extreme pressures. MgB$_2$ exhibits the highest value of $T_c$ of any known binary compound, but the $T_c$ values of elemental superconductors under extreme pressures are not far behind. We have recently used pressures as high as nearly 2 Mbar to induce superconductivity in Sc, Y, and Lu, as well as to search for superconductivity in CaLi$_2$. $T_c$ values as high as 20 K are obtained, comparable to the highest values observed for the A15 compounds. These studies thus allow an investigation into the question: what is the maximum possible value of $T_c$ in a phonon-mediated superconductor?

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