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High-pressure behaviors of a niobium nitride single crystal[1] XIAO-JIA CHEN, VIKTOR V. STRUZHKIN, ZHIGANG WU, RONALD E. COHEN, HO-KWANG MAO, RUSSELL J. HEMLEY, Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, AXEL NØRLUND CHRISTENSEN, Højkolvej 7, DK-8210 Aarhus V, Denmark — We report the measurements of the high-pressure lattice structures, Raman-scattering spectra, and superconducting transition temperatures up to 50 GPa on a non-stoichiometric niobium nitride single crystal. The material remains the simple $B1$ NaCl structure over the whole pressure range with a bulk modulus of 348 GPa, comparable to that of cubic boron nitride. The pressure-induced phonon frequency shifts are obtained based on the Raman-scattering data. These results together with the calculated electronic density of states are used to explain our observed constant superconducting transtion at 12.6 K under pressures in this material.

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