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X-ray emission spectroscopy of cerium under pressure across the volume collapse transition[1] MAGNUS LIPP, BRIAN MADDOX, HYUN-CHAE CYNN, WILLIAM EVANS, Lawrence Livermore National Laboratory, PAUL CHOW, YUMING XIAO, HPCAT, Advanced Photon Source, Argonne National Lab — The satellite structure of the Lγ_1 emission line of elemental cerium generated by the exchange interaction of the $4f$ with the $4d$ level and thus indicative of the $4f$ moment has been studied by X-ray emission spectroscopy. The strength of the moment was measured by integrating the area under the satellite versus energy and comparing it with the very weak structure of the nominally tetravalent CeO_2 at ambient conditions. We find that cerium's $4f$ moment reduces by approximately 35 % across the $\gamma - \alpha$ phase volume collapse (VC). The moment remaining in the α-phase does not change significantly up to 45 kbar. The data lend further support to the Kondo VC model since most of the 4f electrons remain strongly correlated across the transition.

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