Taking advantage of our sensitive laser spectrometer coupled to a pulsed slit jet\(^b\) we recorded near the \(\nu_2\) vibration a series of rovibrational transitions of the \(\text{NH}_3–\text{Ar}\) van der Waals (vdW) complex. These transitions involve in the ground vibrational state several internal rotor states corresponding to the ortho-\(\text{NH}_3\) and para-\(\text{NH}_3\) spin modifications of the complex. They are labeled by \(\Sigma_a(j,k)\), \(\Sigma_s(j,k)\), \(\Pi_a(j,k)\) and \(\Pi_s(j,k)\) where \(\Sigma(K=0)\) and \(\Pi(K=1)\) indicate the projection \(K\) of the total rotational angular momentum \(J\) on the vdW axis, the superscripts \(s\) and \(a\) designate a symmetric or antisymmetric \(\text{NH}_3\) inversion wave function, and \(j, k\) quantum numbers indicate the correlation between the internal-rotor state of the complex and the \(j, k\) rotational state of the free \(\text{NH}_3\) monomer. Five bands have been identified, only one of which was partly observed before\(^c\). They include transitions starting from the \(\Sigma_a(j=0\text{ or } j=1)\) state without any internal angular momentum, consequently they can be assigned from the band contour of a linear-molecule-like \(K=0, \Delta J=1\) transition. The energies and splittings of the rovibrational levels of the \(\nu_2 = 1\leftarrow 0\) spectrum derived from the analysis of the \(\Pi_s, \Sigma_s(j=1)\leftarrow \Sigma_a(j=0), k=0\) bands and mostly of the \(\Sigma_s, \Pi_a\) and \(\Sigma_a(j=1)\leftarrow \Sigma_a(j=1), k=1\) bands bring relevant information about the \(\nu_2\) dependence of the \(\text{NH}_3–\text{Ar}\) interaction, the rovibrational dynamics of the \(\text{NH}_3–\text{Ar}\) complex and provide a sensitive test of a recently developed 4D potential energy surface that includes explicitly its dependence on the umbrella motion\(^d\).

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