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THz spectroscopy of spin waves in multiferroic $BiFeO_3$ in high magnetic fields[1] URMAS NAGEL, T. RÕÕM, Nat.-l Inst. of Chem. Phys. & Biophys., Tallinn, Estonia, H. ENGELKAMP, HFML, Radboud University Nijmegen, The Netherlands, D. TALBAYEV, Tulane Univ., New Orleans, USA, H.T. YI, S.-W. CHEONG, Rutgers Univ., New Jersey, USA — $BiFeO_3$ is both antiferromagnetic and ferroelectric with high Nèel and Curie temperatures, about 640 K and 110 K, respectively. In low magnetic field Fe^{3+} spins order cycloidally, inducing an additional electric polarization, which interacts with the feeroelctric polarization of the lattice and produces a magneto-electric term in the total energy. We have measured the magnetic field dependence of infrared active magnon modes in an untwinned $BiFeO_3$ single crystal at 4K. The magnon modes soften close to the critical field of about 18.8T along the [001] cubic axis, where the cycloid is destroyed and the low field magnon modes disappear. A new strong mode with linear magmetic field dependence appears above 19T and persists at least up to 31T. The dramatic change of the THz spectrum at 19T allows us to assign all the low field modes as excitations of the cycloid.

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