Magnetic Excitations in Multiferroic GdMn$_2$O$_5$. SERGEY POGHOSYAN, SERGEY ARTYUKHIN, Istituto Italiano di Tecnologia — Orthorhombic RMn$_2$O$_5$ compounds recently attracted attention due to a complex frustrated ground state and unconventional excitations. YMn$_2$O$_5$ with non-magnetic rare earth (RE) shows incommensurate spiral state with spins in the neighbouring chains aligned at 90-degrees to each other [1]. RE ions with unquenched angular momentum enable the control of polarization by magnetic field in the multiferroic materials, such as TbMn$_2$O$_5$ [2]. Strongly GdMn$_2$O$_5$, with magnetic rare earth in S=7/2, L=0 state, exhibits a spiral state below 40K, that concedes to a commensurate state below $\sim$ 30K. The latter hosts large magnetically-induced polarization of 3600 $\mu C/m^2$ induced via Heisenberg exchange striction mechanism. This polarization changes by 5000 $\mu C/m^2$ under the external magnetic field [3]. Here we corroborate THz magnetoabsorption data with the microscopic modelling. The magnetic excitations are calculated using model Hamiltonian with parameters extracted from ab-initio simulations.