# Full wave scattering modelling for transverse scattering meteor observations and specular meteor measurements with MAARSY

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Since decades transverse scatter meteor observations are carried out obtaining information about the meteor Earth environment e.g., source radiants, count rates (fluxes) and meteor velocities. Further, these meteor radars are widely used to observe mesospheric winds and temperatures in the atmosphere at altitudes between 75-110 km. However, there was still a lack of the theoretical understanding of the reflection coefficients or radar cross section, which are required to describe physical consistent the observed intensity profiles.

In this study we revisit the full wave scattering theory providing a fully consistent solution for specular meteor observations at multiple frequencies. We solved the full wave scattering model for different plasma distributions and for several frequencies in the VHF range and evaluated our theoretical results to observational data from the triple frequency Canadian Meteor Orbit Radar (CMOR) providing a unique dataset to obtain reliable measurements of the initial trail radius, electron line density and ambipolar diffusion.

Further, we did make use of the much more efficient transverse scattering from meteors by conducting a specular experiment using the high power large aperture (HPLA) radar MAARSY at Andenes. A preliminary survey was carried out during September/October 2017. MAARSY appears to be sensitive to the faintest meteors at low velocities so far observed with remote sensing techniques. We obtained a limiting magnitude of 16 and a peak at a magnitude of 15. The velocity distribution of the observed sporadic meteors peaks around 19 km/s. An initial comparison with the Jupiter-Family Comet dynamical model reveals a significant deviation in the count rates for low velocity (<20 km/s) high mass meteors (r>1000 um, m>8 mg).