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).