**Interpreting Doppler backscattering with beam tracing and reciprocity in tokamak geometry**[1] VALERIAN HALL-CHEN, University of Oxford, CCFE, FELIX PARRA, University of Oxford, JON HILLESHEIM, CCFE — We use beam tracing (Torbeam[2] as well as a newly written code) and the reciprocity theorem[3] to derive a model for the backscattered power of the Doppler Backscattering (DBS) diagnostic. Our model works for both the O-mode and X-mode in tokamak geometry. We present the analytical derivation of our model, providing an understanding of how the DBS signal is localised and the quantitative effect of the mismatch angle. Consequently, one can now correct for the attenuation due to mismatch, avoiding the need for empirical optimisation. We then use our model to determine the wavenumber resolution and find different results from the widely-accepted formula[4].

Valerian Hall-Chen
University of Oxford, CCFE

Date submitted: 29 Jun 2020                    Electronic form version 1.4