

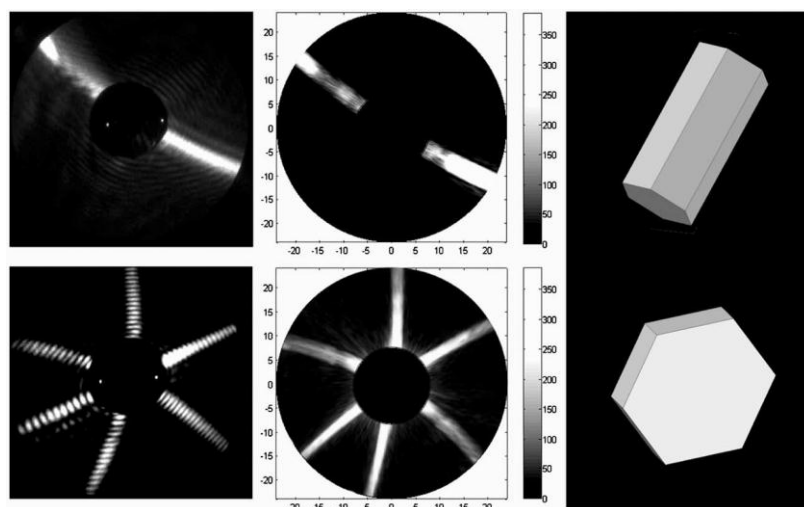


### Dr Evelyn Hesse

Dr Evelyn Hesse is a Senior Researcher at the Centre of Atmospheric and Instrumentation Research within the School of Physics, Astronomy & Mathematics. Her research interests are in atmospheric optics and in particular in light scattering by atmospheric particles.

According to the report of the International Panel on Climate Change, there is a large uncertainty about the impact of Cirrus on the radiation balance. To be able to understand the radiative transfer properties of ice and mixed-phase clouds, a detailed knowledge of the particles' shapes and sizes is required. This is especially true for small ice crystals ( $< 20 \mu\text{m}$ ) for which there is evidence of widespread abundance in cirrus clouds.

Whereas imaging systems are limited by depth of field and optical resolution, instruments like the Small Ice Detector (SID) developed at CAIR, which detect patterns of light scattered by particles are not constrained by these factors. Different from particles images, a more theoretical inversion of the patterns is required to yield quantitative morphological data. Within the CAIR group Evelyn has been developing the Ray Tracing with Diffraction on Facets (RTDF) light scattering model, which is used to interpret SID data. The figure below shows examples of light scattering by a hexagonal column and plate (right column) respectively. The left and middle columns show the SID data and RTDF modelling results, respectively.



RTDF has also been used for interpretation of recent cloud chamber experiments at the University of Manchester and Karlsruhe Institute of Technology (Germany), and of radiation measurements at Saharan dust aerosol and observations of volcanic ash clouds (collaboration with the MetOffice).

Evelyn has been supervising several PhD and MSc projects and is teaching optics on a 2<sup>nd</sup> year course for physics and astronomy students.

