

Short Report

Multiple wave scattering is a vibrant and expanding research area for both theoretical and applied researchers interested in controlling and predicting waves in complex media. Recent advances have brought sci-fi-like capabilities within reach, such as invisibility cloaks and imaging of living cells, with applications in electromagnetics, acoustics, hydrodynamics, and more. The residential long-term character of the MWS programme underpinned a genuine all-community approach to identify the key issues shared among the different branches of wave science that demand new mathematical techniques and computational methods. It accelerated research by introducing methods and results known in one application area to other application areas where corresponding questions were still open. For example, a versatile numerical toolbox was developed during the programme and spread amongst the participants. Moreover, recent ideas in acoustics were found to be transferable to water waves so as to shortcut the route to efficient renewable ocean energy devices.

The MWS programme was hosted in the Moller Institute at the beautiful western end of Churchill College campus. The open-plan space contributed to the close collaborative atmosphere of the programme, which was crucial to its success. We held “coffee breaks” every morning, with at least one informal presentation per week during the breaks (usually from an early career participant), complemented by a seminar series on Thursday afternoons at INI. The formal events kicked off with a Winter School, featuring a series of introductory lectures, group research activities and a hackathon. Four week-long research workshops were held, focussing on specific mathematical, physical or applied topics, and involving research talks and poster sessions. A one-day Open For Business event built links with practitioners in material characterisation and design. A cross-programme event at INI showcased the work of early-career researchers through 3-minute presentations, followed by a barbecue at the Moller Institute on a glorious sunny afternoon.

Over 100 programme participants were involved, including mathematicians, engineers and physicists, from the UK, Europe, North America, Asia, Africa, Australasia ... and Cambridge. We are grateful for support from: INI for participants with families and for DAC fellowships to participants from developing countries; London Mathematical Society for participants from underrepresented groups; Simons Foundation for 18 (?) key participants; UK Acoustics Network for early career researchers; UK Metamaterials Network for the final workshop; US Army and Office of Naval Research (Global) for early/mid career participants from Asia–Pacific regions; and Clare Hall and Churchill College for visiting fellowships. We had two female Distinguished Fellows and a Heilbronn Fellow.

Two of our early career researchers ran a mini-symposium at the British Applied Mathematics Colloquium in Bristol, with talks from programme participants, and we had a strong presence at other major meetings, such as Phononics in Manchester. Our international participants travelled to give invited seminars across the UK. The programme was also featured in *Plus Magazine*, and research from the programme will appear in a Special Feature of the *Proceedings of the Royal Society A*.

