

## **Abstract**

Oberwolfach Workshop:

### **At the Interface between Semiclassical Analysis and Numerical Analysis of Wave Scattering Problems**

Dates:

**25 September – 1 October 2022** (Code: 2239)

Organizers:

**Simon Chandler-Wilde, Reading**  
**Monique Dauge, Rennes**  
**Euan Spence, Bath**  
**Jared Wunsch, Evanston**

The scattering and propagation of waves have been studied by mathematicians for many years. This activity has been motivated by a plethora of applications in science and industry, many involving waves in the mathematically difficult high-frequency limit.

Semiclassical analysis (SCA), as a branch of microlocal analysis, rigorously analyses partial differential equations with large (or small) parameters. In the context of high-frequency wave scattering, SCA seeks to describe precisely the extent to which the dynamics of scattered waves is influenced by the scattering of classical Newtonian point particles in the same geometry; this relationship is a version of the correspondence principle of quantum mechanics. On the other hand, the goal of numerical analysis (NA) in this context is to design numerical methods for computing the scattered wave that are accurate, efficient, and robust, and prove theorems guaranteeing these properties.

In this context of wave scattering, both SCA and NA share the same goal - that of understanding the behaviour of the scattered wave - but these two fields operate largely in isolation, mainly because the tools and techniques of the two fields are largely disjoint.

In recent years there have been promising examples of successful collaboration at the interface of SCA and NA, to the mutual benefit of both fields. This workshop seeks to capitalise on these successes by bringing together members of the SCA and NA communities and catalysing activity at this interface.