Einstein telescope: Point absorption on superpolished surfaces of silicon crystals?

Field: Theory or/and experiment, coherent resonator optics, data acquisition of short time series, modelling

Motivation: Germany is stepping up its ambitions to build the Einstein Telescope in Germany, which is at least ten times more sensitive than LIGO. In order to be able to observe the merging of larger black holes, the mirrors must be made of crystalline silicon. One problem is that even superpolished surfaces of silicon crystals strongly absorb laser light at 1550nm at certain points, which the crystal should not do because the band gap is too large. It is essential to understand the cause.

Aim: A measurement method invented by the working group will be extended so that the surface absorption of plane/flat polished silicon rods of approx. 2.8cm (9.8cm) in length can be measured with spatial resolution. The influence of the polish on the surface absorption at the wavelengths of 1550 nm and 2128 nm is investigated and a polishing method is found that solves the problem.