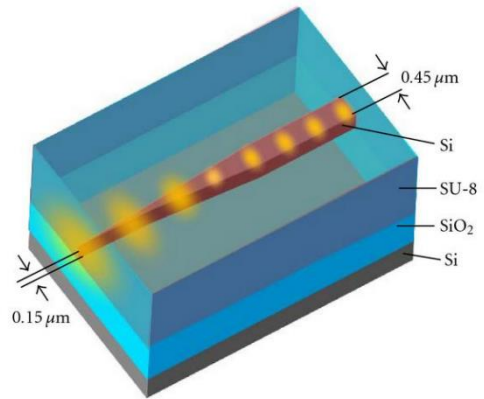


Field propagation in tapered LiNb waveguide structures

The Mesoscopic Quantum Optics group of Prof. Bartley at Paderborn University investigates waveguides created in LiNb substrates by diffusion of Titanium. On top of these structures superconducting stripes are attached which allow detection of the electromagnetic pulses. To increase overlap of the waveguide modes with the detector stripes of Si are put on top of the structure. Slow tapering of the width of the Si stripes allows a smooth (mostly reflection-less) transition of the mode profile. The long distances (in comparison to the typical wavelengths) renders simulations with traditional numerical methods infeasible. Instead, in this project the beam-propagation method shall be used to simulate and optimize pulse propagation in the described waveguide structure.



Example of a tapered strip waveguide, taken from <https://www.hindawi.com/journals/aot/2008/725967.fig.004.jpg>

See https://en.wikipedia.org/wiki/Beam_propagation_method.

In this student project, simulations and optimization of the described structure are performed using a commercially available tool by R-Soft, see <https://www.synopsys.com/optical-solutions/rsoft/passive-device-beamprop.html>.

The project can last one or two semesters and the range of simulations is adapted accordingly.