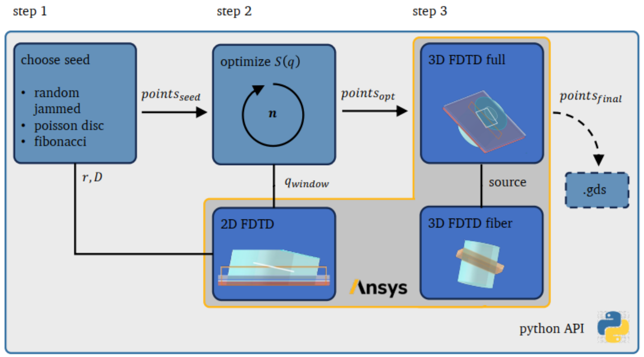

Figure 4.1.: Conceptional flowchart designed to systematically guide the optimization of various parameters in point patterns for MM coupling. Step 1 involves building a seed structure based on parameters like the scatterer radius r and device diameter D of a preliminary 2D FDTD simulation. Step 2 consists of optimizing the structure factor $S(\mathbf{q})$ of the seed structure in a predefined window $\mathbf{q}_{\mathrm{window}}$ previously set as well through preliminary 2D FDTD simulations. Step 3 consists of using the optimized point pattern to build a full-scale 3D FDTD simulation of the fiber-to-chip coupling mechanism and using it to obtain resilient results on the coupling efficiency. The MM fiber source is computed externally to reduce compute costs. The final product is an optimized and simulated point pattern. All of the steps, as well as the .gds file generation, are done in the same Python flexible environment.

lots of details about the simulation methods on luis 2024 thesis

height and 1.5 µm width is situated above a 3.3 µm thick Silicon Dioxide (SiO_2) layer on a Silicon (Si) substrate. Its fundamental mode is displayed in fig. 2.2a) in terms of the normalized real part of its electric field. Higher order modes within a polymer waveguide with cross section 14x14 µm² are displayed in fig. 2.2c) and d).

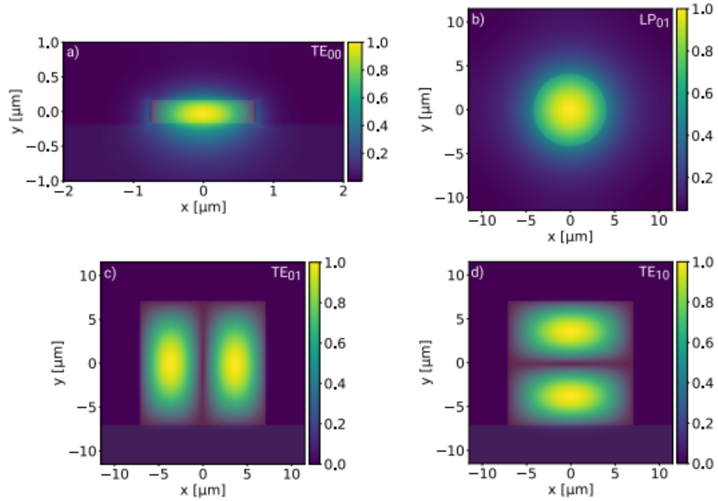

Figure 2.2: Various modes within different waveguide types, simulated via FDTD and displayed in terms of their normalized electric fields. Top: Fundamental modes of a silicon nitride strip waveguide on silica a) and of a single mode fiber with mode field diameter 10.4 µm b). Bottom: Higher order modes within a quadratic polymer waveguide with 14x14 µm² cross-section.

from Hurging 2023