# Master's thesis – track Advanced Matter and Energy Physics

## *'Bragg scattering of a released Bose-Einstein condensate on an atom-chip'*

**Abstract:**
This thesis is devoted to the study of the integrable dilute O(1) loop model on a One-dimensional (1D) gases exhibit interesting phenomena that are not present in either 2D or 3D. Atom chips offer an attractive route to creating and manipulating such 1D gases. By employing specifically designed wire patterns, the magnetic trapping potential of our chip features a strong harmonic confinement in the radial direction. For this project we aimed to build an experimental setup to enhance this atom-chip experiment with an optical lattice in the axial direction. An experimental way to determine if the optical lattice perturbs the atoms is to do Bragg diffraction experiments. This thesis presents the theoretical framework that describes Bragg scattering of a released Bose-Einstein condensate, the building of the experimental setup and the obtained results. With our setup we observed Rabi-oscillations, the resonance spectrum and the momentum selectivity which are characteristics of Bragg scattering. Finally we also showed that by adjusting the parameters of our optical lattice that we can enter a different diffraction regimen, that of Raman-Nath. From this we conclude that we have built an optical lattice that can be used to do experiments on one-dimensional Bose-Einstein condensates on an atom chip.