

## **Abstract**

In this project we proposed two design for XUV flat-field spectrometer. Design I consist of a curved mirror and plane grating. As the efficiency of the high harmonics generation process is poor, so we proposed design II in which we used a curved varied line space grating. In case of curved grating the analysis of spectral image and its focusing property is slightly difficult because the image is focused on a curved surface and the detector we are using is flat detector. So we decided to use a curved varied line space grating which focuses on a flat surface. This thesis starts with a introduction to high harmonics generation and the process is explained classically using three step model, scaling laws, trajectories, measurement techniques are discussed in Chapter 1. In Chapter 2, emphasis is on the detection techniques, gratings are main part of the spectrometer so difference between a plane grating, curved grating, and curved VLS grating are discussed. In Chapter 3, the two designs are studied in detail, Matlab simulation and characterisation is done for the design I, FRED and Matlab simulation are done for design II, image focal plane curves are studied and a 3-D design is proposed. All the ground work is done and VLS design is complete and thesis ends with the comparison between the two design in chapter 4.