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Introduction

The motivation for this bachelor thesis arose from the *AU-SAT Workshop* meeting that took place in late November 2015. The workshop discussed the possibility of the Institute of Physics and Astronomy of Aarhus University building a small satellite named the AU-SAT.

The AU-SAT should make use of new technology to allow for a design much smaller than traditional satellites in space, making the mission affordable for the Institute. The satellite would be build in partnership with the Danish small satellite company, *GomSpace*.

The idea for a small satellite mission designed by the Institute of Physics and Astronomy of Aarhus University, was inspired by two earlier small satellite missions, MOST and BRITE, designed by the Space Flight Laboratory and the Institute for Aerospace Studies at the University of Toronto respectively. These previous missions had shown that science could be preformed with observations made from small satellites.

The AU-SAT mission, however, is not meant to be a copy of the MOST and BRITE missions. For the AU-SAT to build it will have to be able to preform observations that are not possible from any other small satellite mission. The BRITE and MOST missions are used for photometry, the measurement of total radiation intensity, where as the AU-SAT would be used for spectroscopy, the measurement of intensity for different wavelengths. The AU-SAT would be the first satellite to have a spectrograph with a wide wavelength range, and still have the satellite fit inside a shoe box. The AU-SAT would allow the Institute of Physics and Astronomy of Aarhus University access to a satellite for observations, removing the need to wait for available times on other satellites. The possible missions for the AU-SAT include,

- UV spectrum observations of stars.
- Observations of newly discovered stars by NASA's TESS mission, allowing the Institute of Physics and Astronomy of Aarhus University to be on the

front line for new discoveries.

- Observations of star contractions and expansions, allowing for a better understanding of the interior of stars. AU-SAT would be the first to make these observations in different wavelengths.
- Observe exo-planet candidates discovered by TESS, making new discoveries possible.

The conclusion of the AU-SAT workshop was to continue examining the possibility for creating the AU-SAT mission and start testing possible small spectrograph, for use onboard the AU-SAT, with which this thesis is concerned.