The metal content of airborne particles in Landskrona – diploma work 2016 or 2017

Airborne particles cause adverse health effects with thousands of premature deaths in Sweden each year due to inhalation in the respiratory system. During 1977, 1988, 2003, and 2008 measurements have been performed by the Nuclear Physics division at Lund University in Landskrona town. A significant influence from particles containing heavy metals has been recorded due to the heavy industries in the harbour area, and due to the traffic in the town and transboundary air pollution. There is fortunately a positive downwards trend in the concentration of the metals, for example lead. Now, this trend analysis will be continued with the help of a new measurement campaign commissioned by Landskrona municipality and the regional authorities.

In this diploma work, measurements are performed during a month period with special filter samplers in the harbour and downtown area of Landskrona.

The measurement equipment in the Landskrona harbour area.

The ion beam facility with the PIXE technique at Nuclear Physics, Lund University.

After filter sample collection, an ion beam analysis with the PIXE technique is going to be performed to analyse the metal content of the particles. Concentrations and trends are investigated. Finally, a source/receptor modelling run will be performed to estimate how much different sources, like the harbour area, downtown traffic, or foreign countries contribute to the metal concentrations. The analysis is complemented with a trajectory analysis to see where the air has come from during occasions with high metal concentrations.

The work task of the diploma worker includes to install the measurement equipment in Landskrona, to maintain the measurements and to change filter samples each week. Jan Pallon at Nuclear Physics will do the subsequent PIXE analysis together with the diploma worker. The diploma worker will do the concentration and trend analysis together with supervisors and the source/receptor modelling after that. The work will result in the report by the diploma worker and a report to the concerned authorities.

The diploma worker should have experience in either chemistry, physics, environmental science, meteorology or geology. A willingness to perform experimental work and modelling with the source/receptor model is desired.

Main supervisor and more info: Adam Kristensson, adam.kristensson@nuclear.lu.se, mainly source/receptor modelling

Deputy supervisors: Pontus Roldin pontus.roldin@nuclear.lu.se and Erik Swietlicki erik.swietlicki@nuclear.lu.se, concentration and trend analysis, and background into the project.

Deputy supervisor: Patrik Nilsson patrik.nilsson@design.lth.se, Installation of measurement equipment.

To begin earliest: at the end of 2016.