LUND UNIVERSITY | LTH FACULTY OF ENGINEERING

Suggested master degree work within the LTH Profile Area Aerosols 2026

Updated 10 November 2025

Department of Design Sciences

Degree Project in Aerosol Technology, MAMM05, 30 credits

Particulate emissions from Li-ion battery fires

***Contact persons**:* Johannes Rex / Vilhelm Malmborg,
vilhelm.malmborg@design.lth.se

***Project description**:* This project addresses the critical knowledge gap in characterizing hazardous particulate emissions from Lithium-ion battery fires. Using a comprehensive dataset from 2024 pilot-scale experiments at DBI (Denmark), the student will analyze both online (particle size/mass) and offline (chemical composition) data. The primary objective is to determine the Emission Factors (EFs) for these hazardous aerosols. This involves quantifying total particle mass (PM) and number (PN) emissions across different fire stages. The analysis will specifically focus on identifying and quantifying high-toxicity compounds and battery-related elements (e.g., PAH, Co, Ni, Li) released during thermal runaway.

***External partner**:* DBI, Denmark

Non-Exhaust Emissions from Different Road Surface Materials

***Contact person**:* Vilhelm Malmborg / Sara Bengtsdotter, vilhelm.malmborg@design.lth.se / sara.bengtsdotter@design.lth.se

***Project description**:* Non-exhaust emissions from road wear are a dominant source of urban particulate matter. The project aims to quantify and characterize how different road surface materials influence these emissions. The student will analyze data from recent experiments at VTI, including particle number, mass, size, and chemical/elemental composition. Key tasks involve conducting a literature review and processing the experimental data to determine emission factors (EFs) for each surface and key compounds. This thesis will contribute valuable data to the development of screening methods for low-emission road pavements.

***External partner**:* VTI, Linköping

Oxidative Potential of Non-Exhaust Traffic Emissions: Focus on Brake, Tire, and Road Wear

***Contact person**:* Vilhelm Malmborg, vilhelm.malmborg@design.lth.se

***Project description**:* With the upcoming integration of Oxidative Potential (OP) into EU air quality monitoring, understanding its sources is more critical than ever. This master's thesis project will focus on a key area of concern: Non-Exhaust Emissions (NEE) from traffic. As traditional exhaust emissions decrease due to technology and electrification, wear particles from brakes, tires, and roads, as well as resuspended road dust, are increasingly recognized as significant sources of air pollution and potentially major contributors to ambient OP. In this project, you will perform a comprehensive assessment of non-exhaust particles Oxidative Potential (OP) and the production of related Reactive Oxygen Species (ROS) using established and potentially novel methodologies. We are looking for a student with a background in chemistry, physics, environmental science, or a related field and a strong interest in air pollution, its health effects, and policy.

Department of Physics

Degree Project in Physics, PHYM01, 30 credits

Aerosol sources in the Arctic

***Contact person**:* Pontus Roldin, pontus.roldin@fysik.lu.se

***Project description**:* In this project you will study the sources of aerosol particles in the Arctic. You will learn to run an atmospheric chemistry transport model. The results from the model will be combined with aerosol particle observations from icebreaker expeditions and research stations in the Arctic. The aim is to get a better understanding of how natural and anthropogenic emissions of gases and particles influence the aerosol particle concentrations and cloud droplet number concentrations in the Arctic. It may also be possible to perform an aerosol observation field campaign on the Faroe Islands.

***External partner**:* Sigurd Christiansen, The University of the Faroe Islands

Department of Industrial and Mechanical Sciences

Degree Project in Machine Elements, MMEM01, 30 credits

Evaluation of brake emissions using a dynamic brake testing protocol

***Contact person**:* Jens Wahlström, jens.wahlstrom@lth.lu.se

***Project description**:* This is an experiment-based project where the students can get hands on experience on testing brake components from passenger cars. In this project, the students will have opportunities to evaluate brake particle emissions from innovative and traditional brake materials from worldwide leading brake part supplier, TMD Friction in Germany. Airborne particles concentration and size distribution will be measured with advanced particle spectrometers. You will get a lump sum scholarship to visit Keio university, Japan, and analyze the collected particles regarding the metal content and cell toxicity. The purpose of the project is to

innovate novel brake materials for lowering the brake particle emissions, promoting a more sustainable transport and society.
***External partner**:* TMD Friction, Germany; Keio university, Japan

Validation of novel brake rotor materials on their performance in extreme brake conditions

***Contact person**:* Yezhe Lyu, yezhe.lyu@lth.lu.se
***Project description**:* We are asked by Volvo Cars to validate their innovative brake rotor materials produced through ferritic nitrocarburizing (FNC) technology. The FNC treated material has a great potential to largely prolong the lifespan of brake components and reduce the brake particle emissions. However, its performance in extreme brake conditions (high brake force, high speed) is unclear. In this project, the students will have opportunities to evaluate brake performance and brake particle emissions from FNC material supplied by Volvo Cars. Airborne particles concentration and size distribution will be measured with advanced particle spectrometers. You will get a lump sum scholarship to visit Keio university, Japan, and analyze the collected particles regarding the metal content and cell toxicity. The purpose of the project is to innovate novel brake materials for lowering the brake particle emissions, promoting a more sustainable transport and society.
***External partner**:* Volvo Cars, Sweden; Keio University, Japan

The municipality of Malmö

Thesis on Air Quality in the municipality of Malmö

***Contact person**:* Victor Andréasson, victor.andreasson@malmo.se
***Examples of project ideas**:* particle mass vs particle numbers, inbound transportation of particles from forest fires, dispersion modelling