



**DEPARTMENT OF ENERGY TECHNOLOGY**  
AALBORG UNIVERSITY

## **PhD Public Defence**

- Title:** Transient Study of Hybrid Concentrating Photovoltaic-Thermoelectric Systems and Solar Thermoelectric Generators
- Location:** Pontoppidanstræde 105, room 4.127
- Time:** Thursday 14 February at 13.00
- PhD defendant:** Sajjad Mahmoudi Nezhad
- Supervisor:** Professor Lasse Rosendahl
- Moderator:** Associate Professor Thomas Condra
- Opponents:** Associate Professor Kim Sørensen, Dept. of Energy Technology, Aalborg University (Chairman)  
Professor Gao Min, Cardiff University, UK  
Professor Dario Narducci, University of Milano Bicocca, Italy

**All are welcome. The defence will be in English.**



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## **Abstract:**

Solar energy can be directly converted to electricity using solar thermoelectric generators (STEGs) and photovoltaics (PVs). In the regions with partly cloudy climates, the instabilities of the weather conditions and consequently daily solar radiation have a substantial influence on the conversion efficiency and performance of PVs and TEGs. These fluctuations in the output power can be a critical concern to stabilize the electrical response of the systems. In this Ph.D. thesis, the main goal is to investigate the transient behavior of the TEGs in the hybrid concentrated photovoltaic-thermoelectric generator (CPV-TEG) systems and STEGs. A solar simulator is used to deliver the concentrated light to the CPV-TEG and STEG systems in the experiments. In parallel, a thermally coupled numerical model is developed and solved by using the finite volume method (FVM). The model includes detailed phenomena of thermoelectricity such as temperature dependent material properties, Peltier coefficient, Thomson coefficient, and the Seebeck coefficient. Power generation and conversion efficiency of the systems are acquired experimentally and numerically and discussed in detail.