**NOMATEN JUNIOR SEMINAR**

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# Studying dislocation density evolution in polycrystalline Mg alloy with machine learning

Henri Salmenjoki, Doctoral Candidate, Dept. Applied Physics at Aalto University (Finland)

**ABSTRACT:**

Plastic deformation of crystalline materials is a complex phenomenon driven primarily by the motion of dislocations which are line-like defects in the crystal structure. In polycrystalline materials, the complexity increases due to grain boundaries which affect the dislocations by pinning them and blocking their movement. Understanding the dislocation processes and interplay with the grain boundaries is essential in improving and designing specific material properties.

Here we discuss recent attempts on using machine learning to forecast certain aspects of the deformation process. The used data is from tensile tests of polycrystalline Mg alloy and obtained by electron backscatter diffraction. In the first part of the talk, we present results on comparing the grains before and after loading by clustering the grains using the observed dislocation structures. And in the second part, we apply regression methods to try to predict the grain-wise evolution of the dislocation density.

**BIO:**

Henri Salmenjoki is a doctoral candidate in the Complex Systems and Materials group at Aalto University, Department of Applied Physics.
Working under the supervision of Prof. Mikko Alava, main focus of his research has been to apply machine learning methods in the study of crystal plasticity and discrete dislocation dynamics simulations.