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To all members of the
Faculty of Physics

Vienna, 20 January 2025

Invitation to the public defense of the doctoral thesis

**“Experimental realization of direct- and inverse-design
magnonic devices”**

by

Noura Ahmed Elsamanoudy Abdelmeguid Zenbaa

Monday, 27 January 2025, 11:00 a.m.

Seminarroom 1, Zi.3158, Boltzmannngasse 5, 1090 Vienna

Magnonic devices leverage spin waves for energy-efficient data processing and computation. This thesis presents the experimental realization of key magnonic components, including diodes, logic gates, and frequency demultiplexers. Particular focus is placed on Yttrium Iron Garnet (YIG) and YIG/CoFeB bilayers, where non-reciprocal spin-wave propagation is demonstrated, enabling diode functionality. Additionally, a universal inverse-design platform is developed, leveraging a reconfigurable array of current loops to realize various functionalities and optimize the performance using feedback-loop algorithms. Experimental validation of this platform highlights its capability to implement versatile RF and logic components. The results emphasize the potential of magnonics as a scalable, energy-efficient alternative for future computing and signal-processing technologies.

Defense committee:

Dirk Grundler, École Polytechnique Fédérale de Lausanne (EPFL), CH (reviewer)

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