SUSTAINABLE SYSTEMS

Fields of Expertise TU Graz

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In the 19th round of the initial funding program, surprisingly only two proposals were submitted in our FoE, one of them in the category of climate neutral university. In the past, the FoE Sustainable Systems has often received many more proposals than we could fund, but now for the second time in a row we have received fewer proposals than expected, and this time we haven't even used up what we've set aside for funding. While we are quite certain that this will change again in future rounds of this long running and very successful funding program, we are for once able to describe the two projects that received funding in a bit more detail.

Christopher Albert from the Institute of Theoretical Physics is one of the two recipients. He is planning an FWF START + Horizon Europe ERC Starting Grant application for the fall of 2024. The title of the proposed research is Adaptable Laboratory Platform for Stellarators (short: ALPS). Stellarators are devices for magnetic fusion plasma confinement, a key component in current research in fusion energy, a technology that will enable vast climate-neutral energy to be produced once fully developed. Recent game-changing advances in simulation, optimization, and experiments point to the stellarator as the device that can live up to this promise. The goal of a stellarator fusion power plant is in reach but comes at a substantial cost and development effort – billions of euros and decades of development and construction.

Compared to this overall perspective, the funding volume of 1.2 million euros for the project is rather modest. The project is part of a broader initiative to establish the first fusion energy experiment in Austria. The main national partners are from the physics and engineering faculties of TU Graz and TU Wien, and the main international cooperation will take place with the University of Lisbon, the Max Planck Institute for Plasma Physics and Kharkiv Institute of Physics and Technology and include the spin-offs Proxima Fusion and Type One Energy. The group's unique approach aims at tabletop-size scale models for rapid prototyping of non-nuclear reactor aspects. Parts will be produced using cutting-edge additive manufacturing techniques. This multi-purpose platform will support research on key physics and technology, testing new and unconventional approaches, and provide access to students for training and education.

The research proposal of the second project, which was granted in the climate neutral university category, couldn't be more different. Iveta Sarmanova from the Institute of Structural Design wants to study the structural load-bearing capacity of earthen materials ("Nummerische und experimentelle Betrachtung der Tragfähigkeit von Lehmbauten"). Earthen materials are building materials with very low greenhouse gas (GHG) emissions, often left as waste deposited in soil excavation landfills. In this FFG research, which Sarmanova is to undertake with a consortium of university as well as industry partners, earth is assumed to be a load-bearing building material for two construction methods: rammed earth structures and clay masonry. Currently these methods are mostly used as non-load-bearing filling materials, as there is no contemporary design tool that enables civil and structural engineers to design the load-bearing capacity of structures of clay masonry and rammed earth digitally on a 3D building model. Through experimental testing and finite element analysis, the applicant wants to provide the groundwork for increased use of earthen materials also as load-bearing structures of buildings.

We wish both applicants the best of luck with their proposals and hope that the resulting projects can one day be presented on these pages.