



# Bachelor and Master Theses: MADMAX

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[www.physik.uni-hamburg.de/iexp/gruppe-garutti.html](http://www.physik.uni-hamburg.de/iexp/gruppe-garutti.html)



## MADMAX @ Uni Hamburg

The **MA**gnetized **D**isc and **M**irror **A**xion **eX**periment is an axion experiment aiming to search for dark matter axions in the mass range of 40 to 400  $\mu\text{eV}$ . Axions are hypothetical particles which due to their small mass and weak couplings provide a good candidate for cold dark matter. MADMAX uses the dielectric haloscope approach to probe an otherwise difficult to access part of the axion parameter space which is favored in the post-inflationary scenario. Axions can be converted to (microwave) photons at a dielectric boundary surface inside a strong magnetic field. To boost the power from axions converting to photons to detectable levels, several dielectric discs are placed in defined distances to each other forming the booster. Currently, many small-scale prototypes are tested within the MADMAX collaboration including data takings inside a large-bore dipole magnet at CERN. In 2024 the MADMAX Prototype Cryostat will arrive, which will host the medium-scale prototype of the booster and, after initial commissioning at Hamburg, will also take data at CERN.

Our group is engaged in many important aspects of MADMAX:

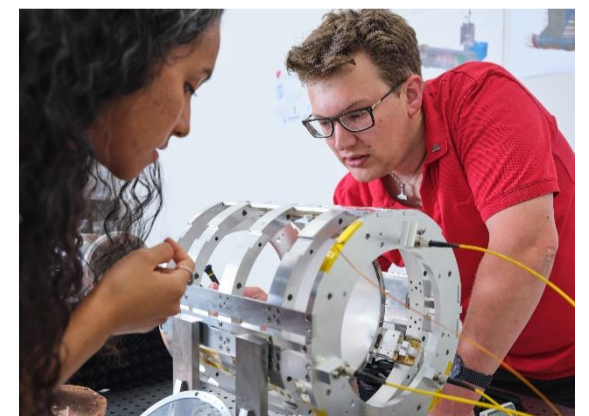
- Calibration of the booster using the bead-pull method
- Development of the booster and its piezo-based drive system for the disc positioning
- Procurement and commissioning of the MADMAX Prototype Cryostat

We offer opportunities for Bachelor and Master theses on many aspects of this experiment. You will obtain detailed knowledge about RF simulation & measurements, piezo motors, cryogenics and data analysis. You may also participate in a data taking campaign at CERN.

Bead pull setup for booster calibration



Booster prototype



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Curious? Contact us:

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