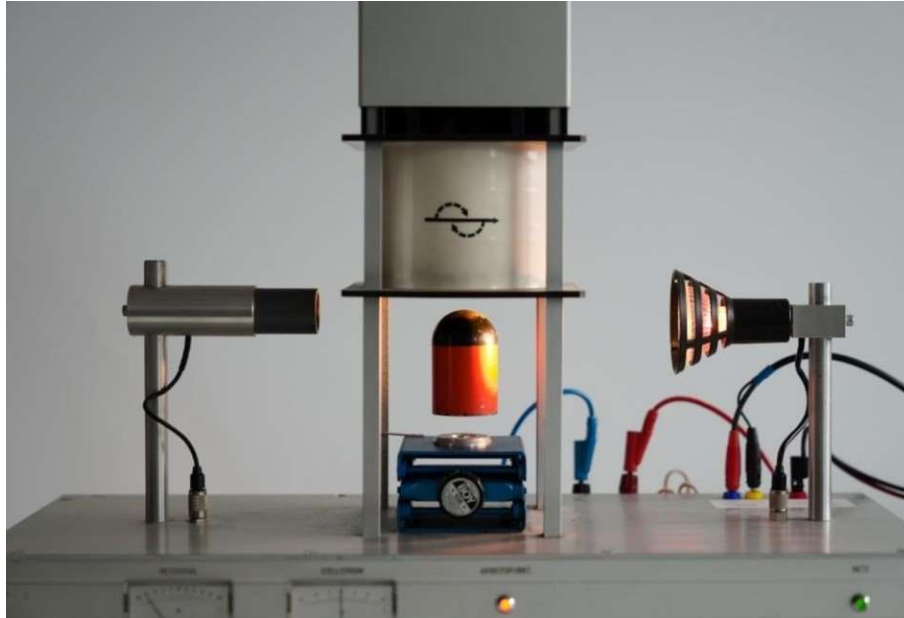


## Project work / Lab / Seminar work(s)

### Magnetic Levitation - Advanced Control Concepts



### Description

Magnetic levitation inherently exhibits interesting characteristics for industrial systems, such as no friction and no noise. Although magnetic levitation can be extremely useful and advantageous, its control remains challenging due to nonlinearities and its intrinsic unstable dynamics.

This project work, therefore, consists of designing and testing advanced control schemes for the magnetic levitation. From identification of nonlinear models to impedance control or feedback linearization, several concepts can be designed, tested and compared to standard controllers.

**We are looking for** one or several students with a solid background in mathematics, mechanics, and/or programming to tackle a number of challenging control problems with our guidance, such as:

- nonlinear model design and identification;
- imagine and implement advanced control methods such as impedance control, feedback linearization, Kalman filter...;
- compare different control methods and exhibit their strengths and limitations.

The work will typically be organized into three distinctive phases:



1. understanding of the current setup and existing models and controllers;
2. theoretical design of advanced control methods, and test on simulation;
3. calibration and test on the real system;
4. elaboration of documentation for the newly designed controllers and observers.

**What would you learn?** - During this project work, you can face the real challenges of controlling nonlinear and unstable fast dynamics. Therefore you will strengthen your skills in terms of:

- understanding and modeling of nonlinear systems;
- identification of nonlinear unstable system;
- design of advanced control and observer methods; • learning the basics of dSPACE software and hardware: equipment largely used in industry for prototyping and testing controllers.

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