

# Autonomous measurement target for reflective optical communication

## ■ Tasks:

- Design of a weather-proof casing for retro-reflectors, LED and electronics
- Evaluation of suitable energy sources (solar, battery, ...)
- Integration of an RF interface

## ■ Supervisor

- Andreas Sinn, [sinn@acin.tuwien.ac.at](mailto:sinn@acin.tuwien.ac.at)

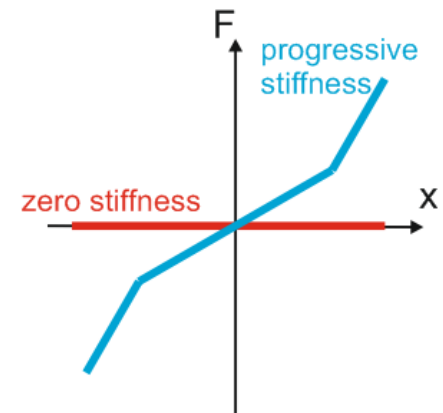
## ■ Number of students: 1



# Design and evaluation of progressive spring mechanism

## ■ Aufgabe / Task:

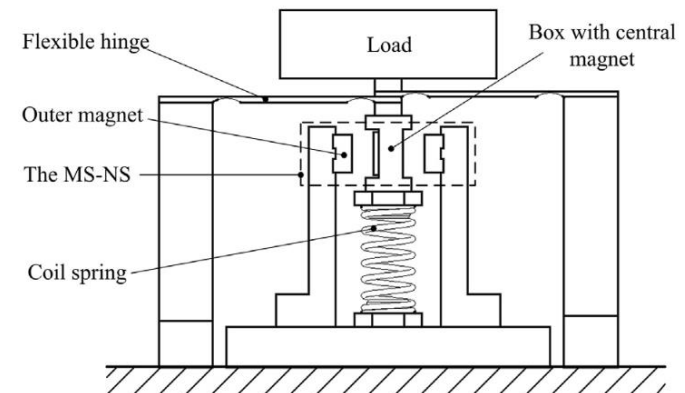
- Review concepts for progressive springs and quasi-zero-stiffness systems.
- Concept for progressive stiffness using spring-magnet combination.
- Build setups and evaluate resulting stiffness.
- Simulate effect of permanent magnets for stiffening on reluctance actuator.



## ■ Supervisors

- Ernst Csencsics  
csencsics@acin.tuwien.ac.at

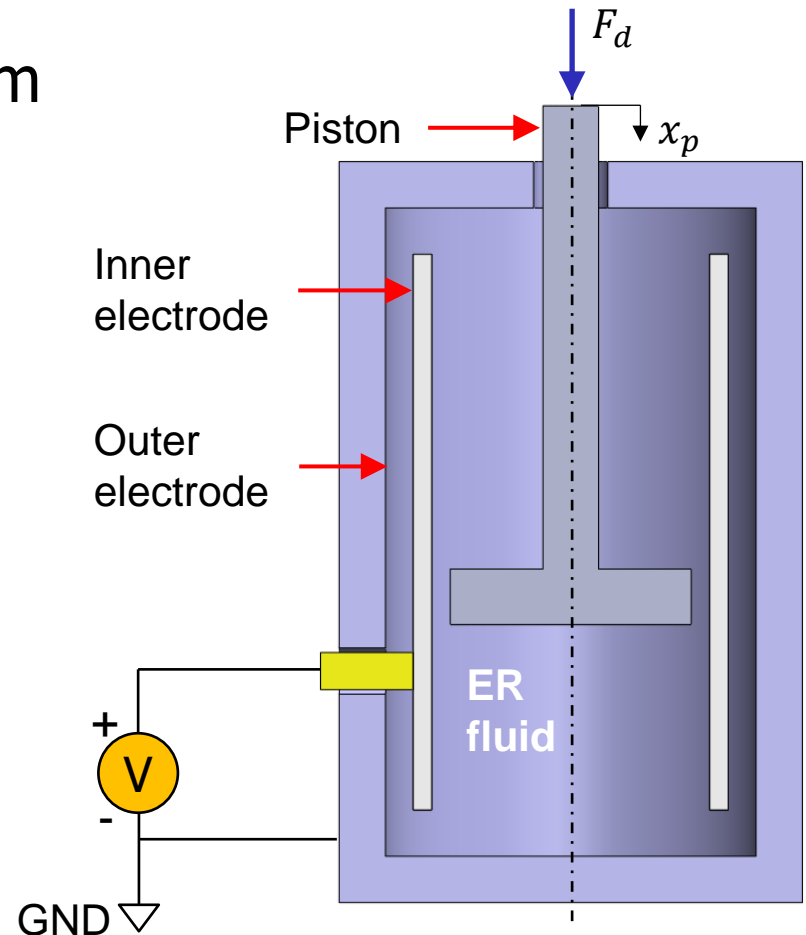
## ■ Anzahl Studenten / Number of students: 1



[Wenjiang Wue, et al. Analysis and experiment of a vibration isolator using a novel magnetic spring with negative stiffness. J. of Sound and vibration, Vol. 333, 2014.]

# Design of an Electro-Rheological Damper

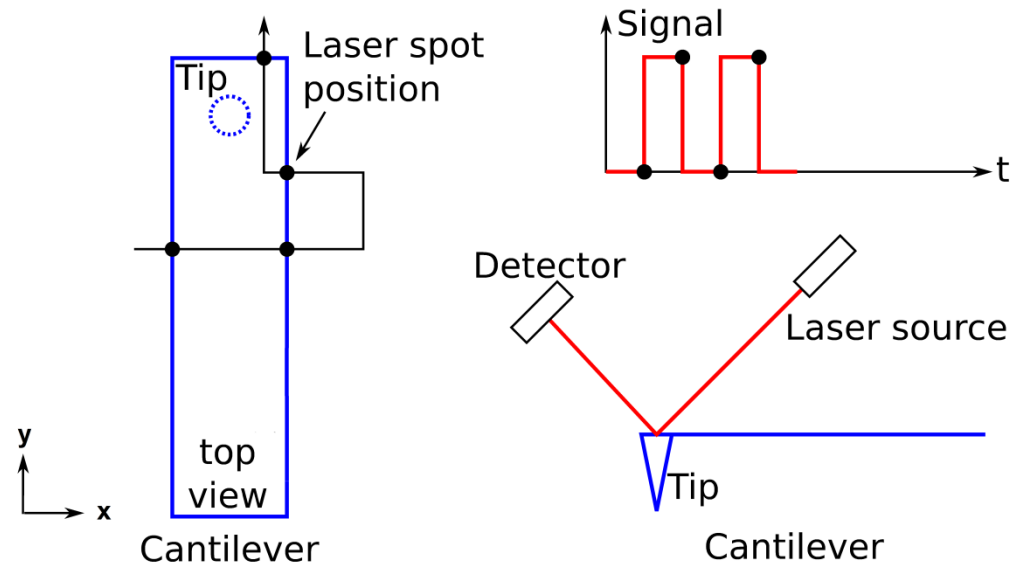
- **Problem description:** realize an electro-rheological (ER) damper to tune the level of damping in a mechatronic system
- **Tasks:**
  - Design of the ER damper
  - Implementation and experimental validation
- **Supervisor:**
  - Francesco Cigarini ([cigarini@acin.tuwien.ac.at](mailto:cigarini@acin.tuwien.ac.at))
- **Number of students: 1**



# Automated laser alignment on an AFM cantilever

## ■ Aufgabe / Task:

- Interfacing piezoelectric motors and photodetector to MATLAB
- Development of a MATLAB algorithm for automated laser spot alignment on the cantilever



## ■ Supervisor:

- Francesco Cigarini, [cigarini@acin.tuwien.ac.at](mailto:cigarini@acin.tuwien.ac.at)
- Severin Unger, [unger@acin.tuwien.ac.at](mailto:unger@acin.tuwien.ac.at)

## ■ Number of students: 1



<http://www.piezomotor.com/>

# Measuring large wavefronts with multiple Shack-Hartmann Sensors

## ■ Problem description

- Measure a large wavefront with multiple Shack-Hartmann Sensors

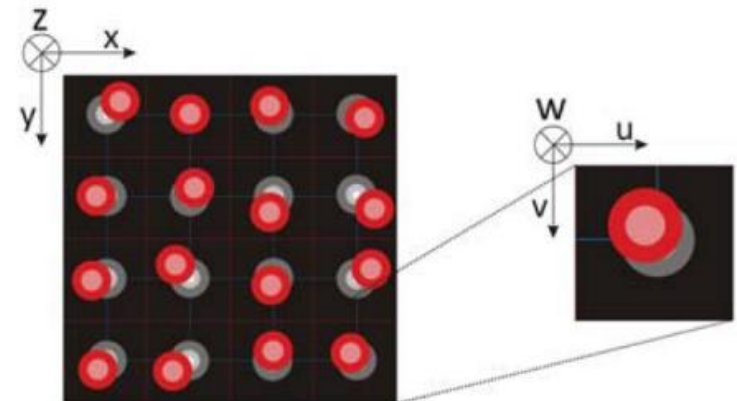
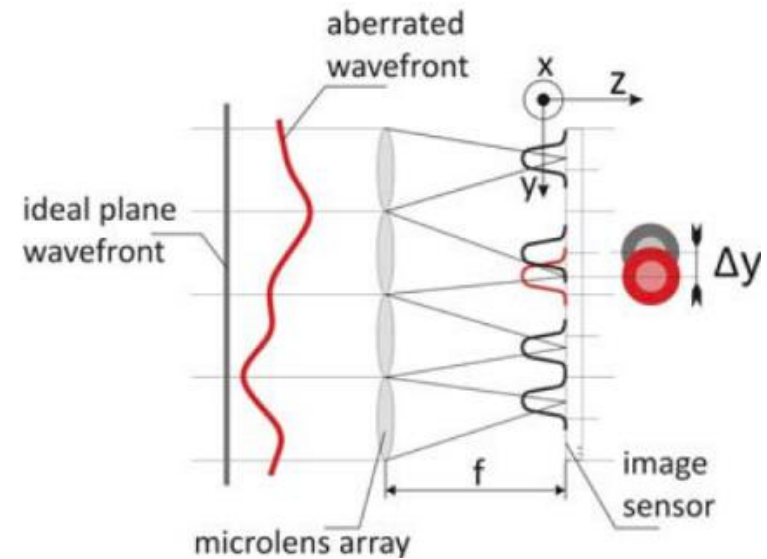
## ■ Aufgabe / Task

- Learn about Shack-Hartmann Sensors
- Build a setup that holds multiple Shack-Hartmann Sensors
- Develop an algorithm for wavefront reconstruction

## ■ Supervisor

- Severin Unger,  
unger@acin.tuwien.ac.at

## ■ Anzahl Studenten / Number of students: 1



[Thier, Markus. FPGA Based Wavefront Sensor, Master Thesis, 2012]

# Analysis and feedback control of a Laser Confocal Displacement Meter

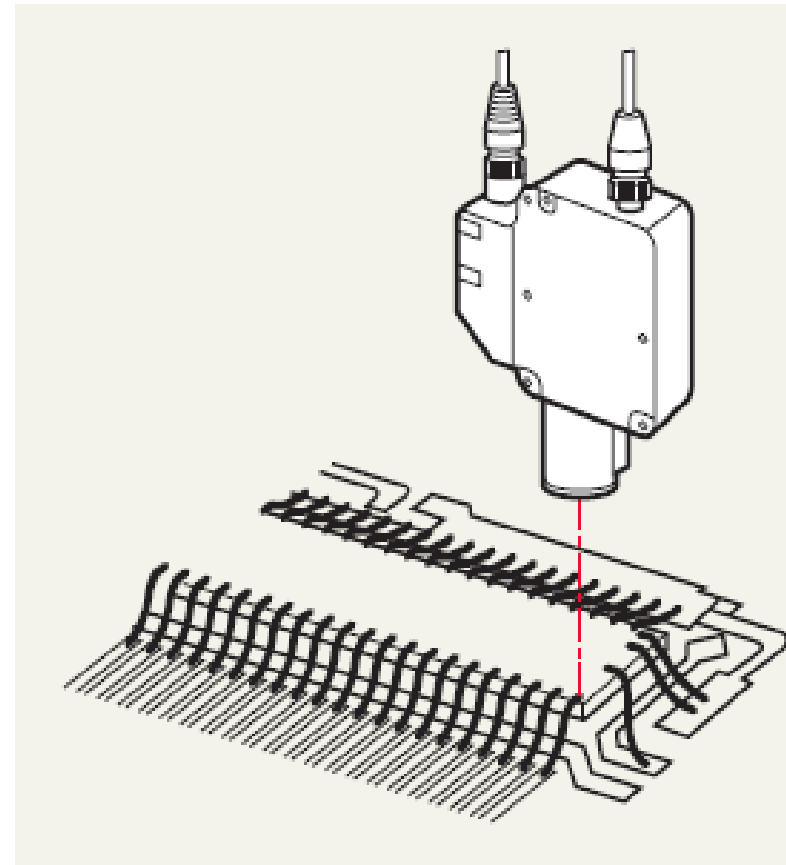
## ■ Aufgabe / Task

- Learn about the active confocal measurement principle
- Disassembling of a commercial mechatronic system:  
Laser Confocal Displacement Meter (Keyence)
- Possibly improve the system

## ■ Supervisor

- Severin Unger,  
unger@acin.tuwien.ac.at

## ■ Anzahl Studenten / Number of students: 1



[Datasheet LT series, Keyence]

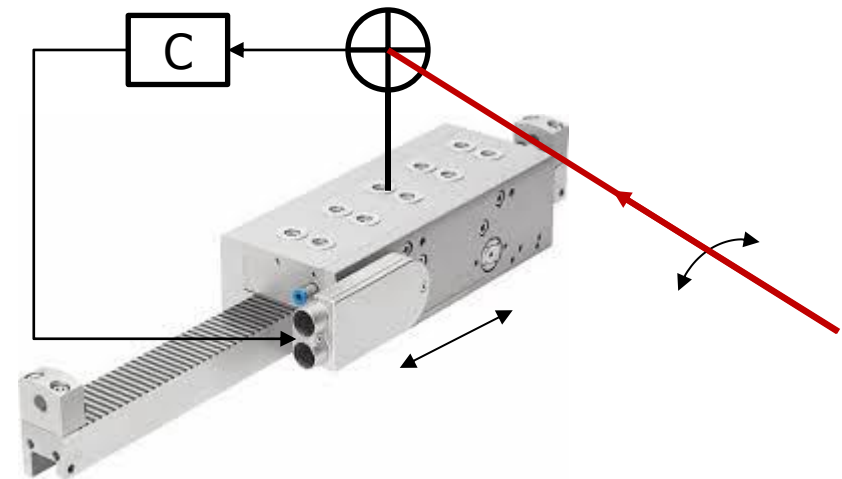
# Motion control for a high performance linear motor for the purpose of laser target tracking

## ■ Problem

- The performance optimization of laser tracking systems in the lab environment requires a suitable target system with equally high performance

## ■ Task

- Control of a high performance linear motor with air bearing
- Implementation of 1D motion system for the purpose of detecting and tracking of a laser beam



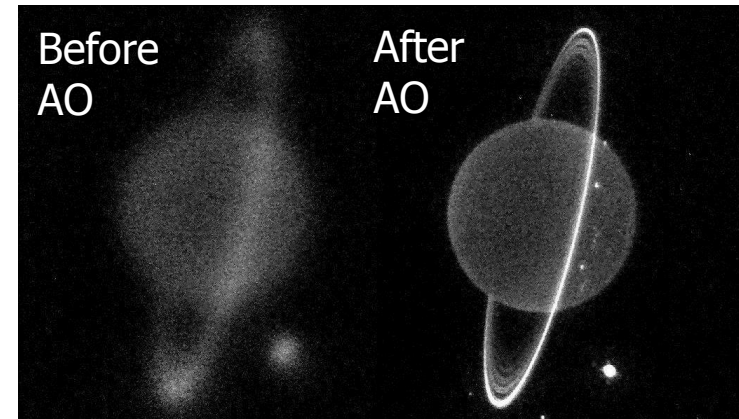
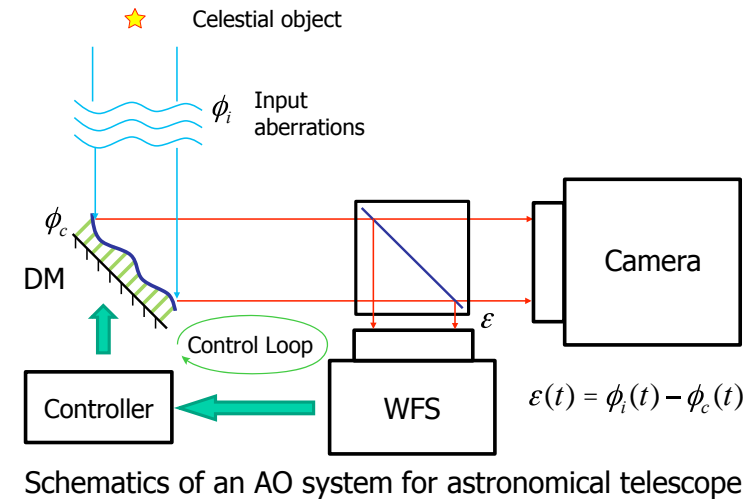
## ■ Supervisors

- Riel Thomas, [riel@acin.tuwien.ac.at](mailto:riel@acin.tuwien.ac.at)

## ■ Number of students: 1

# Characterization of an Adaptive Optics System

- This project characterizes an adaptive optics kit in ACIN to verify its correction performance with various control designs: a static feedback, static feedback with noise, LQG approaches
- Applications: biomedical imaging, astronomical telescopes
- No optics knowledge are required and if necessary it will be fully guided. At last you will gain the knowledge on it.
- Aufgabe / Task:
  - Build an AO system based in the kit and SDK. (basic software is given)
  - Design and implement multiple controllers.
  - Verify and evaluate the design
- Supervisor
  - Han Woong Yoo , yoo@acin.tuwien.ac.at



Near-infrared images of Uranus before and after AO is on. Heidi B. Hammel, Imke de Pater and the W.M. Keck Observatory.