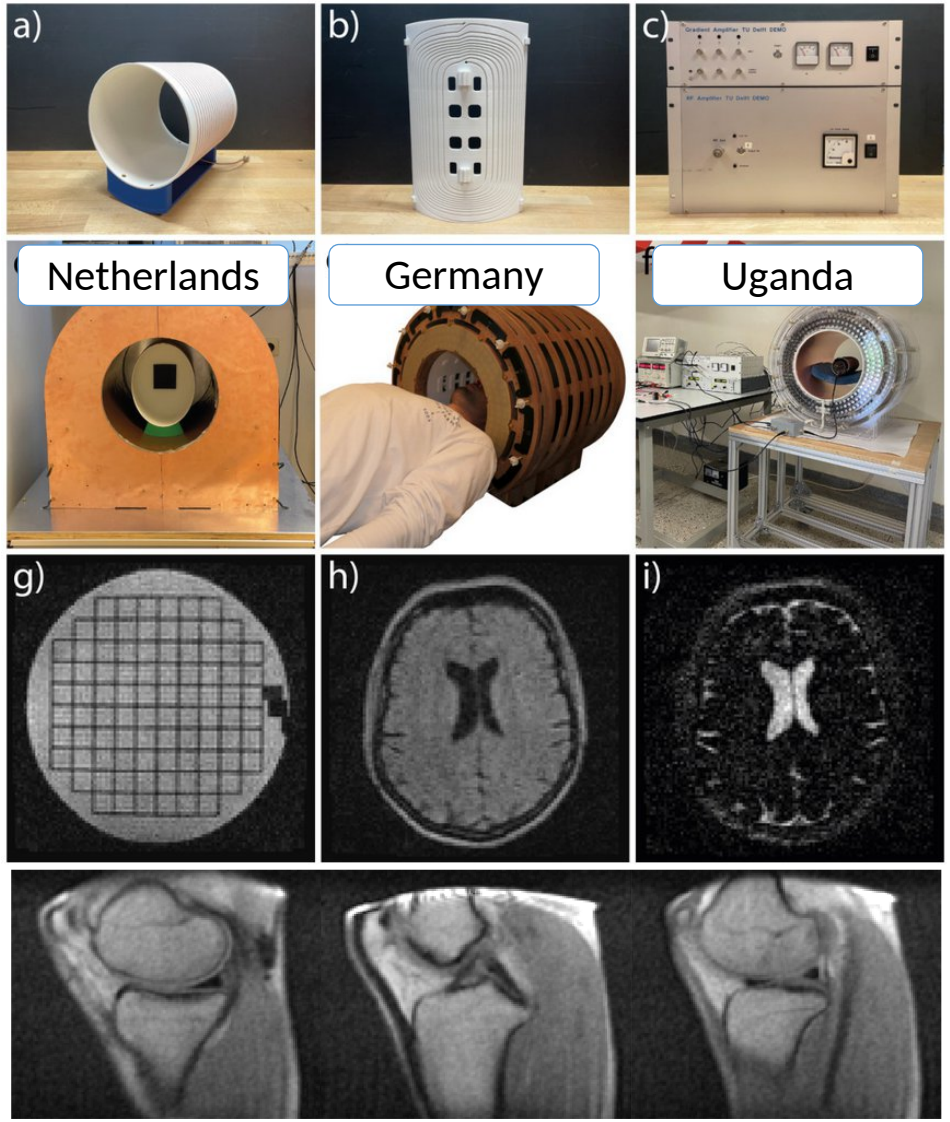
OSI² ONE low-field MRI scanner



- **Head- and extremities**
- **~20.000€ material costs**, easy construction with low-cost machines
- **Portable system** overall weight <150kg, standard power socket
- **B_0≈50mT**
- **Open-source hardware and software**

https://gitlab.com/osii

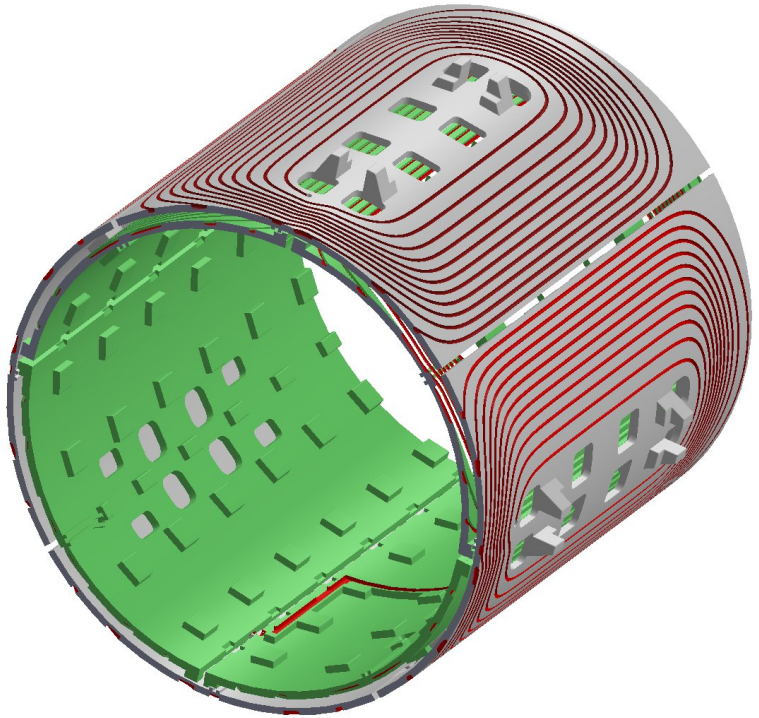
https://www.opensourceimaging.org/

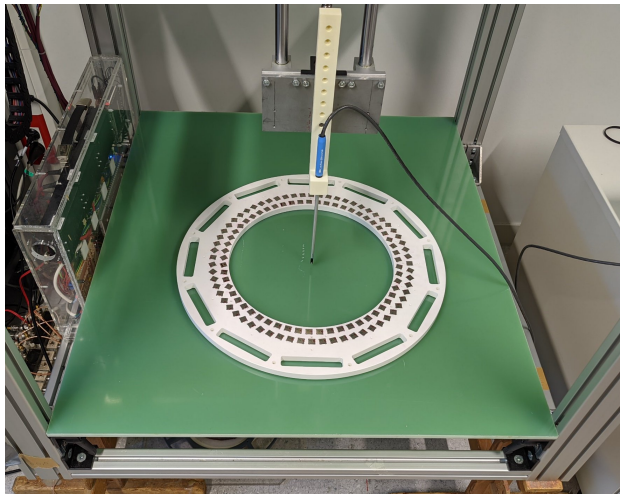
Source: https://www.youtube.com/watch?v=KY6X4T3NN3U

Das OSII-System wird in das Forschungsprogramm des IBI integriert

- Nachbau der vollständigen Hardware

Image Sources:
https://zenodo.org/records/10079661

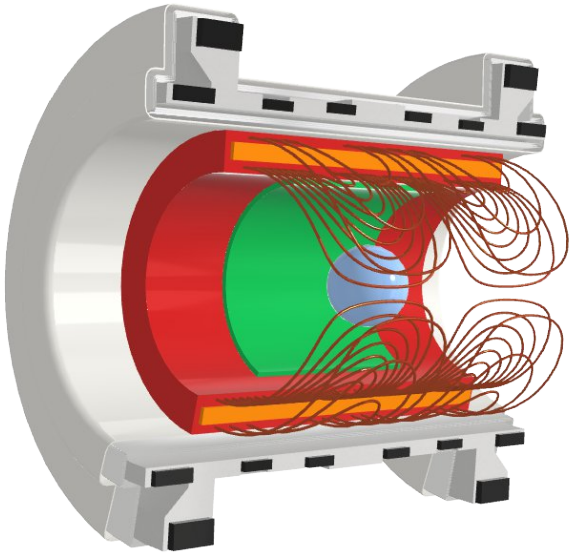




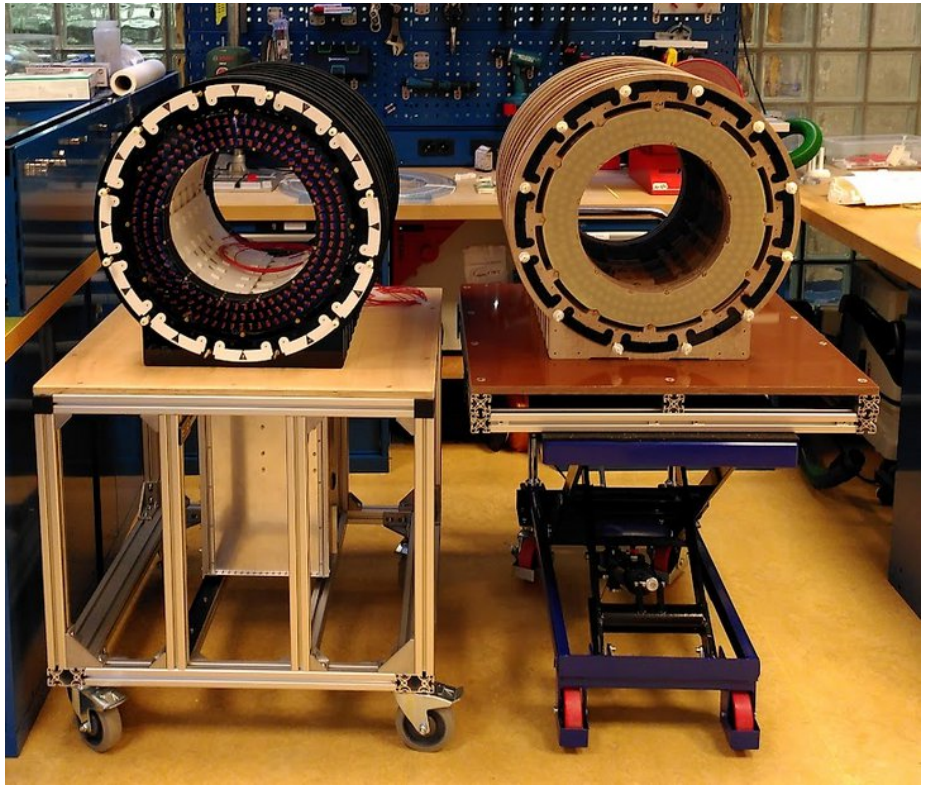
Systemdesign und Projektdurchführung (PhD-Arbeit):

Julia Pfitzer

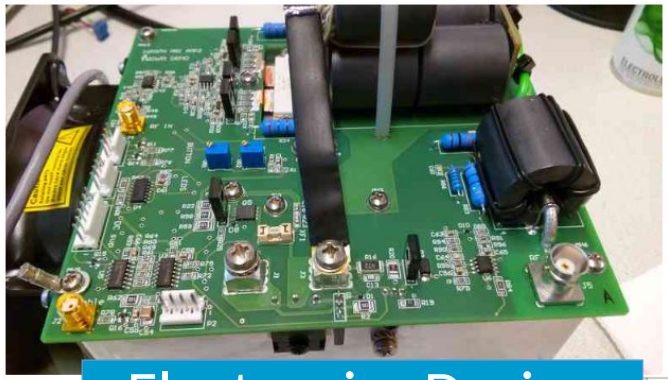
Kontakt:
jpfitzer@tugraz.at



Simulate



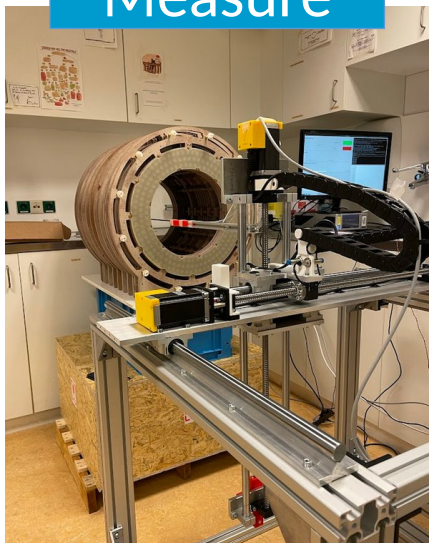
Sources:
https://zenodo.org/records/10079661



Electronics Design

Assemble

Measure



Coding and Sequence Design

```
# Create slice selective RF pulse
rf, gz, gzr = pp.make_sinc_pulse(
    flip_angle=ALPHA * np.pi / 180,
    duration=2.56e-3,
    slice_thickness=SLICE_THICKNESS,
    system=system,
    return_gz=True,
)

# define other gradients and ADC event
delta_k = 1 / FOV
gx = pp.make_trapezoid(channel="x", flat_area=NX * delta_k, flat_time=3.2e-3, system=system)
gx_pre = pp.make_trapezoid(channel="x", area=-gx.area / 2, duration=1e-3, system=system)
adc = pp.make_adc(num_samples=NX, duration=gx.flat_time, delay=gx.rise_time, system=system)
phase_areas = (np.arange(NY) - NY / 2) * delta_k

# calculate timing
delay_TE = TE - pp.calc_duration(gx_pre) - pp.calc_duration(gz) / 2 - pp.calc_duration(gx) / 2
delay_TR = TR - pp.calc_duration(gx_pre) - pp.calc_duration(gz) - pp.calc_duration(gx) - delay_TE
```

Im Kontext des Projekts wird es laufend Bachelor- und Masterarbeiten geben …. fragen Sie aktiv nach !

Hardware:

Magnetbau
Elektronik (Leistung, Hochfrequenz,…)

Software:

Weiterentwicklungen und Integration von institutseigener Software
Sequenzen
Hardwarenahe Programmierung und Regelung

Experimentelle Arbeiten:

Feldmessung
Qualitätskontrolle
Systemevaluierung

Simulationen:

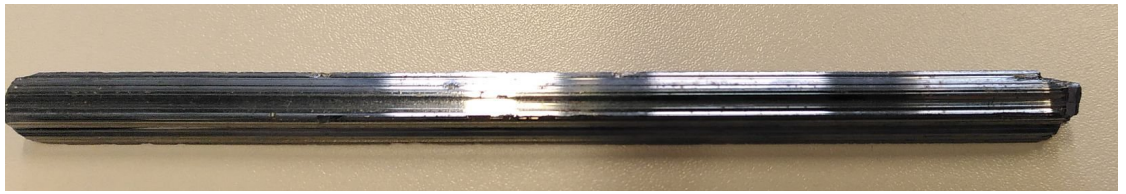
Feldoptimierung

Kontakte:

H. Scharfetter
Hermann.scharfetter@tugraz.at

Julia Pfitzer
jpfitzer@tugraz.at

BA: Investigating Signal Anisotropy of Nuclear Quadrupole Resonance Spectroscopy in Stibnite



Very coarse: NQR = NMR without a magnet (special materials like antimony)

Tasks:
- Literature review
- Construction of a new NQR spectroscopy setup to investigate the signal anisotropy
- Acquisition and analysis of NQR data

Recommended :
- Very Basic knowledge in NMR spectroscopy
- Interest in building and developing new hardware setups
- good electronics knowledge and hands-on skills