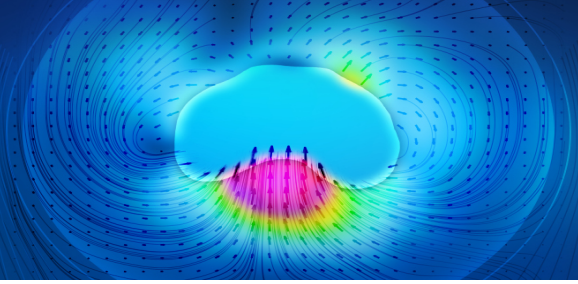
TUHH Hamburg University of Technology

Institute of Process Imaging



HiWi Student

Particle preparation for gas-solid fluidized beds

Motivation:

Gas-solid fluidized beds are extensively used in various industries, including pharmaceuticals, energy, and chemical manufacturing, due to the enhanced gas-solid contact. Their inherently opaque, three-dimensional (3D) nature makes hydrodynamic investigations challenging. As a result, many studies employ intrusive probes or rely on pseudo-two-dimensional beds, which do not capture the full 3D behavior. Advanced tomographic techniques address these limitations by providing non-invasive, spatially resolved measurements of 3D hydrodynamics. One such technique is Magnetic Resonance Imaging (MRI), which has been used to measure bubble properties and particle velocities in fluidized beds with high spatio-temporal resolution [1].

In this work, a vertical MRI system is used to study various 3D fluidized beds. As particles, in addition to commonly used agricultural seeds such as poppy seeds, porous particles soaked in liquids and dried on their surface are also used as the MRI-active solid phase. An advantage of the porous particles is that they come in various sizes, making it possible to investigate different processes.

Tasks:

- Particle preparation for the fluidization experiments
- Determination of particle properties, such as signal decay, using a benchtop Nuclear Magnetic Resonance (NMR) spectrometer

Your profile:

- Ideally, prior laboratory work experience.

Starting date: January 2026

Duration of the contract: 5 months / 39.5 hours per month (might change depending on the starting date

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References: [1] Penn, A. et al., Industrial & Engineering Chemistry Research, (2018)