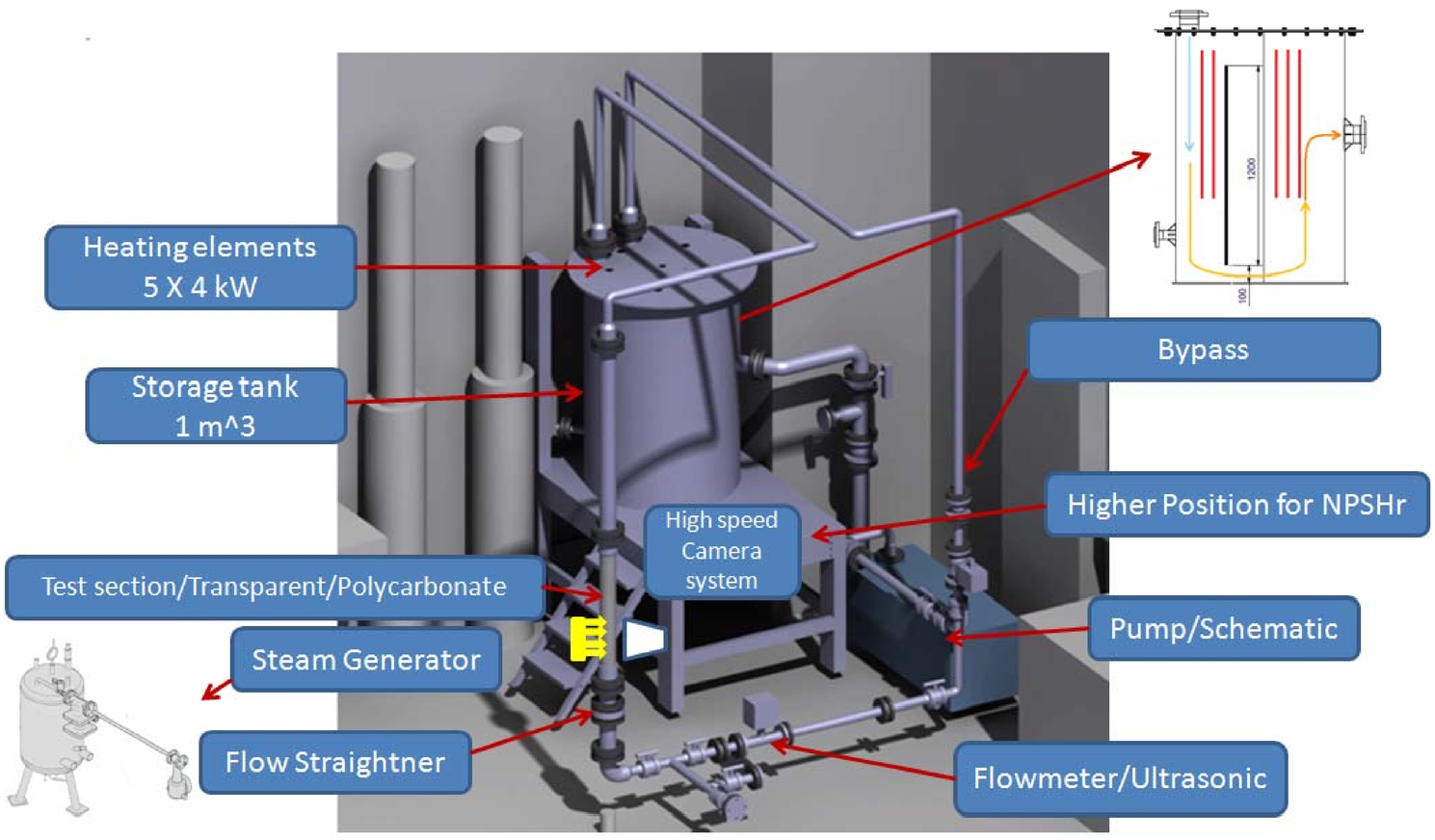
NTech
Lehrstuhl für
Nukleartechnik

Experimental facilities for investigation of two-phase flows related to nuclear safety research at NTech

Dipl.-Ing. Suleiman Al Issa

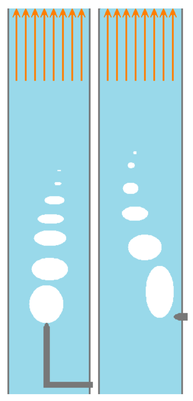
Facility 1: Steam bubble condensation in flowing sub-cooled water



Facility parameters

• Mediums	Liquid phase: **DI Water**, Gas phase: **Steam/air**
• Pressure	~ 1 bar
• Water Temperature	up to to **ΔTsub=1 C** (approximately ~ 98 C @ 1bar)
• Water superficial velocity	up to **1.3 m/s** in DN100 pipe.
• Steam superficial velocity	up to **0.5 m/s** in DN100 pipe.
• Injection nozzle size	Different sizes/geometries applicable (currently vertical nozzle **ø4 mm**)
• Test section	Large diameter **DN100** transparent pipe, height **1 m**.

Via Isolation of the condensation phenomenon



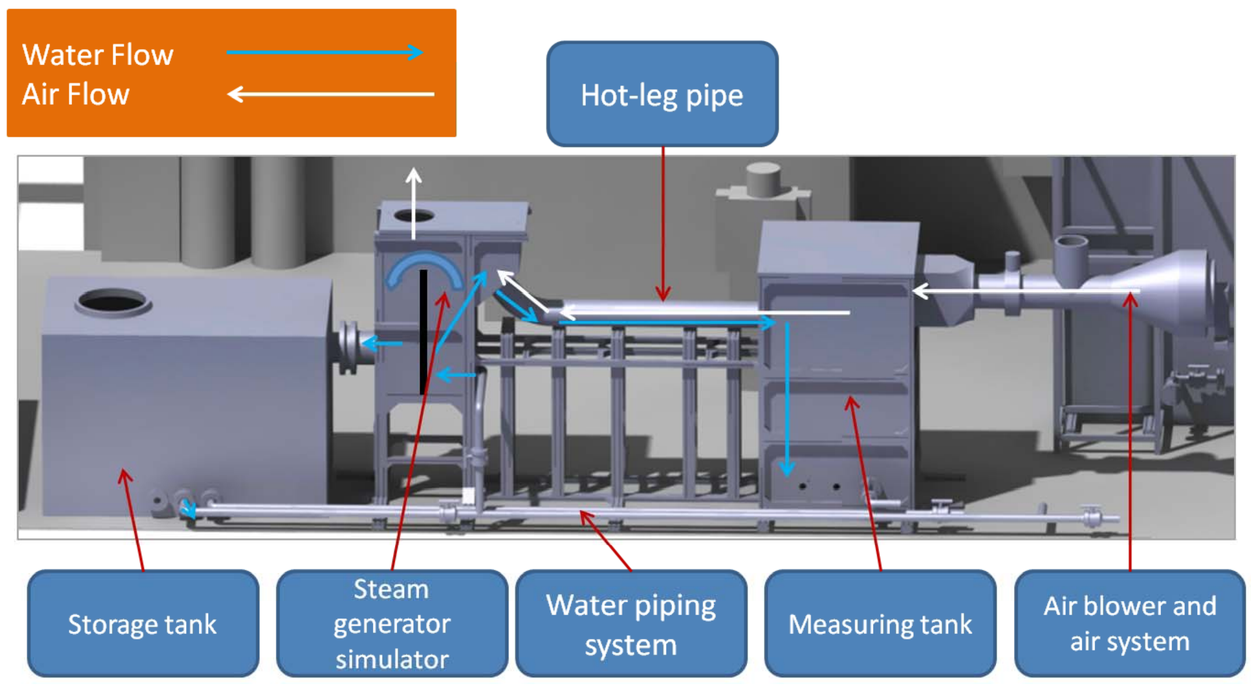
→ Better experimental values of interfacial terms such as **heat transfer coefficient** which is bubble size dependent

Experiments' main parameters

- Steam superficial velocity J_G
- Water superficial velocity J_L
- Water subcooling temperature ΔT_{sub}
- Injection nozzle size/ bubble size D_B

Facility 2: Counter current flow limitation in PWR hot-leg model (CCFL)

Experimental 3D Design



CCFL experimental investigation in large-diameter DN200 pipe geometry

→CCFL main occurrence during LOCA /SBLOCA through ECC injection/ or Reflux condensation.

Experiments' main parameters

- Non-dimensional Steam/water superficial velocities $J_G^{*0.5}/J_L^{*0.5}$

•Facility parameters

- Pressure ~ **1 bar.**
- Medium Air/ DI water@room temperatures.
- Test section **N200** pipe geometry.
- Scale **1/3** scaled model of real PWR.
- $J_G^{*0.5}/J_L^{*0.5}$ up to **0.7/0.3**.

For more info. contact: Dipl.-Ing. Suleiman Al Issa issa@ntech.mw.tum.de Tel 089 289 15630/34