

Master Thesis:

3D-printed lenses for arrays of Radio-Frequency Superconducting Nanowire Single-Photon Detectors

Arrays of **Single-Photon Detectors (SPD)** are required for many applications, including Quantum information, Laser communication and ranging, spectroscopy etc. **Superconducting Nanowire SPDs (SNSPD)** outperform Semiconductor-based SPDs in many metrics, but development of arrays is challenging.

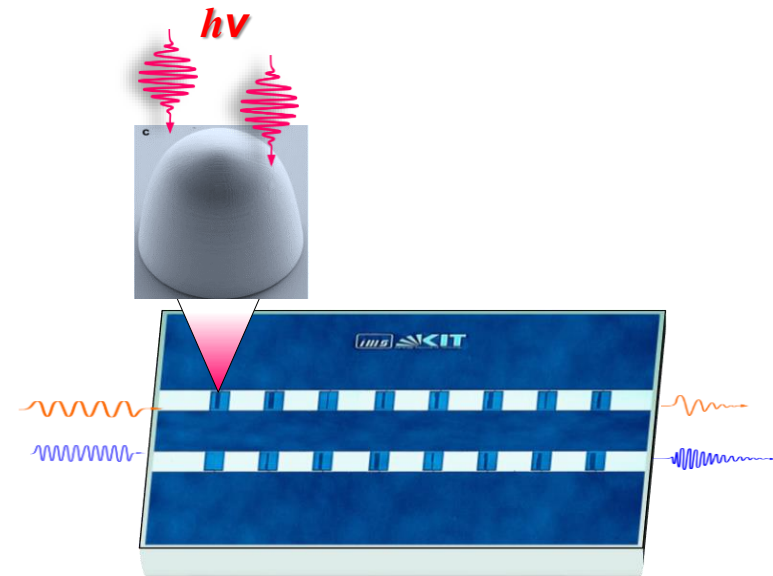
IMS KIT currently develops SNSPD-arrays with Frequency-Division Multiplexing – “**RF-SNSPD**”. To increase optical coupling, the possibility of using 3D-lithography written freeform micro lens assemblies shall be evaluated. These will be fabricated in an additive manufacturing step at IPQ.

Your tasks may include:

- Design of microlenses and microlens arrays using in-house developed tools
- 3D-lithography fabrication of freeform lenses on RF-SNSPD chips
- Participation in characterization experiments
- Investigation of lithography schemes for increased fabrication throughput

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Doerner, S., et al. *Applied Physics Letters* 111.3 (2017): 032603.
Dietrich, P.-I., et al. *Nature Photonics* 12, 241--247 (2018).