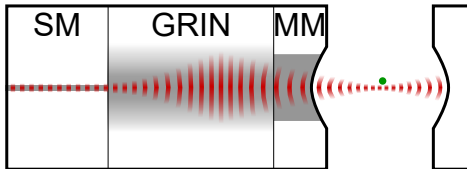
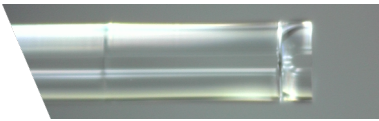


## Master's Thesis in Experimental Physics

# *Fabrication of mode matched fiber Fabry-Perot cavities*

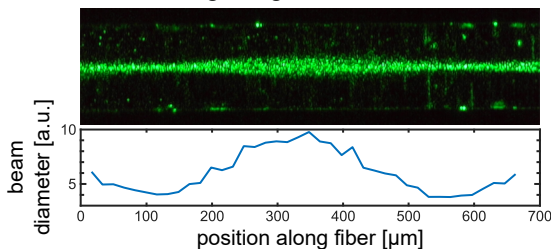


Stack of fibers for mode matched cavity



Our group uses Fabry-Perot cavities to store light pulses in trapped cold atoms. The cavity mirrors are fabricated on the end facets of two optical fibers. When light couples from the singlemode fiber to the cavity, the occurring mode mismatch limits the reachable coupling efficiency ( $\leq 60\%$ ). Fiber-integrated focusing systems using gradient index (GRIN) fibers can increase it to up to 90%.

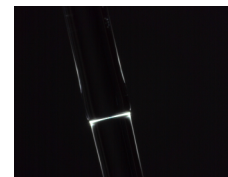
Re-focusing of light inside a GRIN fiber



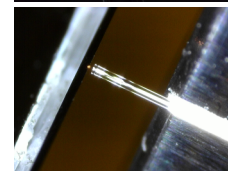
The objective of this project is to assemble and characterize mode-matched fiber Fabry-Perot cavities. It includes advanced fiber assembly techniques, shooting of ultra-smooth mirror surfaces onto fiber end facets and building miniaturized optical cavities. The fabricated cavities will be used in our experiment, but also have broad applications in combination with other emitters, in filtering and spectroscopy.

### *What you will learn:*

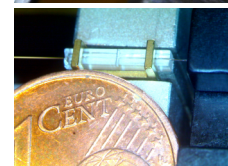
- Advanced fiber optics techniques ( $\mu\text{m}$ -precision cleaving, fusion splicing)
- Hands-on experience with infrared fiber and free-space optical setups
- Laser-shooting of fiber mirror structures onto fiber end facets
- Miniaturized fiber cavity assembly and characterization



fiber splice



knife-edge mode measurement



miniaturized fiber cavity

If you are interested, please contact: Prof. Dieter Meschede (meschede@iap.uni-bonn.de),  
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For more details visit : <http://quantum-technologies.iap.uni-bonn.de>

