

Workshop »Coatings for Optics and Optical Components«

Antireflection coatings for objective lenses with requirements for quantum optical experiments

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Quantum optical experiments for the next generation quantum computers require ultra-high vacuum conditions which are realized in vacuum quartz cells. Quantum computing setups with neutral atoms excited to Rydberg state or trapped ions typically require lasers at various wavelengths and light incidence angles that must pass high-NA objectives for individual qubit manipulation in large arrays at the diffraction limit.

For the objective consisting of multiple lenses, it is extremely important not to lose light by unwanted reflection. In addition, polarization effects and laser damage conditions must be considered. The paper discusses the comprehensive requirements and first solutions for antireflective coatings applicable for an objective which is under development at Qioptiq.

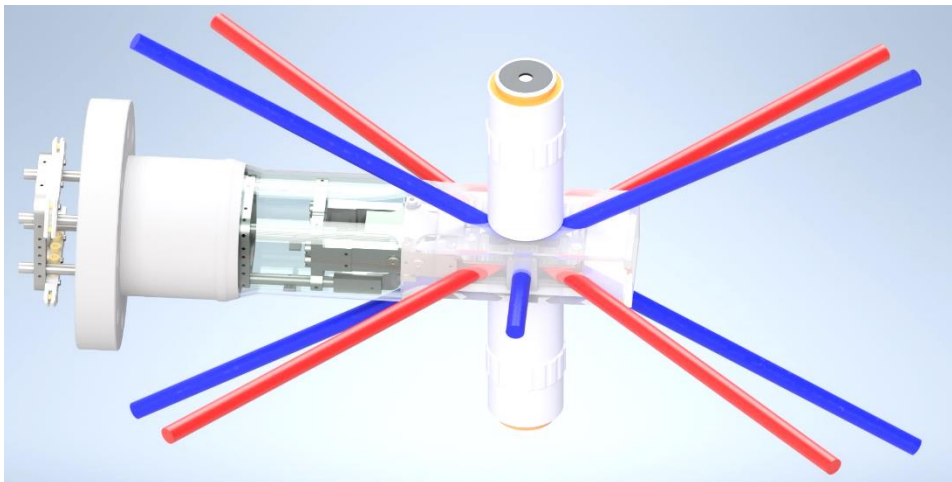


Figure 1 Setup for quantum computing experiments: Ultra high vacuum quartz cell with various laser beams and UV-VIS-NIR objective. Glass windows and objective lenses must be coated with high performance AR coatings for a broad spectral and AOI range, partly containing electromagnetic shielding.