

Phase locking of two diode lasers

Supervisors: Prof. Andrei Sidorov and Dr Alexander Akulshin

Two laser beams with the frequency separation of 6.8 GHz are required in studies of “slow light” and “storage of light” phenomena and for the preparation of coherent superposition of hyperfine states with ^{87}Rb atoms. Mutual coherence of the beams is of paramount significance for the successful realisations of these effects. A typical system involves beating laser beams on a fast photodiode, mixing the microwave beat signal with a stable reference signal at 6.8 GHz, and feeding back the error signal to a current control of one of the lasers.

Such optical system is often called a Raman laser system and most elements of the electronic circuit will be purchased. The reference 6.8 GHz signal will be produced from the Agilent MW synthesizer or Rb standard. Such a Raman laser system can be used for changing light propagation from subluminal to superluminal or for EIT-based storage of light in BEC on an atom chip project. The project is of experimental nature and will involve building electronic circuits, the diode laser operation and laser spectroscopy experiments with atomic vapours and cold atoms.