Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Making custom fiber lasers for use in an atomic physics experiment.[1] ALI KHADEMIAN, GARNET CAMERON, KYLA NAULT, DAVID SHINER, Univ of North Texas — Fiber lasers can be a reasonable choice for a laser source in atomic physics. Our particular applications involve the optical pumping and in some applications cooling of various transitions in atomic helium. Doped fiber with emission at the required wavelengths is necessary. Readily available fiber and approximate wavelength emission ranges include Yb (990 – 1150 nm), Er/Yb (1530 – 1625 nm) and Th (1900 -2100 nm). High efficiency conversion of pump photons into stable single frequency laser emission at the required wavelength is the function of the fiber laser. A simple fiber laser cavity uses a short (˜few mm) fiber grating high reflector mirror, a doped fiber section for the laser cavity, and a long (˜few cm) fiber grating output coupler. To ensure reliable single frequency operation, the laser cavity length should be within 2-3 times the output grating length. However the cavity length must be long enough for round trip gains to compensate for the output mirror transmission loss. Efficiency can be maximized by avoiding fiber splices in the fiber laser cavity. This requires that the gratings be written into the doped fiber directly. In our previous designs, back coupling of the fiber laser into the pump laser contributes to instability and sometimes caused catastrophic pump failure. Current designs use a fiber based wavelength splitter (WDM) to study and circumvent this problem. Data will be presented on the fiber lasers at 1083 nm. Work on a Thulium 2057 nm fiber laser will also be discussed.

[1]This work is supported by NSF grant 1404498.

Ali Khademian
Univ of North Texas

Date submitted: 29 Jan 2016 Electronic form version 1.4