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Convenient fiber laser sources for use in atomic physics[1] RONNIE CURREY, GARNET CAMERON, ERIN THORNTON, ALI KHADEMIAN, DAVID SHINER, University of North Texas — The evolution of rare-earth doped fiber lasers has had an impact on developing convenient laser sources. These sources can provide high power single transverse modes with near Gaussian beam shape from single mode double clad fibers. We have been interested in building Thulium (Tm) doped fiber lasers designed for operation at 2058 nm and Ytterbium (Yb) doped fiber lasers at 1083 nm for studying the helium atom. Fiber lasers can be pumped by very reliable and low-cost high-power fiber coupled solid state lasers operating at 920, 975 and 793 nm. The components of our laser systems are readily available and cost effective, in particular the technology of fiber Bragg gratings (FBG) provides laser cavities inside fiber glass with minimum cavity loss that is a critical factor for efficiency. We will discuss our development and characterization of a 2058 nm Tm doped fiber laser with an output power of over 2 W and our development and characterization of a Yb doped laser at 1083 nm with an output power of over 20 W. Future development includes a 1083 nm single frequency Yb fiber laser. These different laser sources operating in the 1 μm to 2 μm regime give reliable cost-effective solutions to driving helium transitions.

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