

CHAPTER 6: ACTIVE SPECTROSCOPY

D.M. Thomas¹, G.R. McKee², K.H. Burrell¹, F. Levinton³, E.L. Foley³, and R.K. Fisher¹

¹General Atomics, P.O. Box 85608, San Diego, California 92186-5608, USA

²University of Wisconsin-Madison, Madison, Wisconsin, USA

³Nova Photonics, Inc., Princeton, New Jersey, USA

Contact author: D.M. Thomas, General Atomics, P.O. Box 85608, San Diego,
California 92186-5608, Phone (858) 455-2403, Fax (858) 455-4156,
e-mail: dan.thomas@gat.com

Abstract. In this chapter we discuss the various diagnostic techniques in which active spectroscopy plays a role. The use of an injected neutral beam- either a dedicated diagnostic beam or the main heating beams - to localize and enhance the spectroscopic measurements described in Chap. 5 has been exploited for a number of key physics measurements, in particular detailed profile information on ion parameters, the radial electric field, plasma current density, and turbulent transport. The ability to make these detailed measurements has been a key element in the development of improved plasma performance. The neutral beam techniques have been extended by the use of such beam analogs as laser beams, gas puffs, and pellet injection for specific measurements. In each case we describe the general principle behind the measurement and include several successful examples of their implementation, briefly touching on some of the more important physics results. We conclude with a few remarks about the relevance and requirements of active spectroscopic techniques for future burning plasma experiments.