Plasma Study Group, Autumn 2013

'Plasma Diagnostics' reading list:

Soft x-ray measurements:

1) Radiation processes producing soft x-rays:

Hutchinson I. H., *'Principles of plasma diagnostics'*, 2nd Ed. §5.3 'Radiation from electron-ion encounters, bremsstrahlung, recombination radiation, x-ray imaging.'

The articles below give examples of the uses of SXR measurements with emphasis on fluctuation measurements. Other uses could be for example to measure electron temperature, Z_{eff} or high-Z impurity transport. It's not intended that you should understand all of these articles in depth but read them to get an idea of how these techniques can be used to study phenomena in the plasma core, where few passive diagnostics are available.

2) Explanation of x-ray tomography technique and nice examples of results from JET:

Granetz, R. S., Smeulders, P., *'X-ray tomography of JET'*, Nucl. Fus. **28** (1988) 457.

3) Full description of three-color, multi-channel SXR diagnostic for fast T_e profile measurements with discussion of the underlying physics:

Delgado-Aparicio L. F., Stutman, D., K. Tritz et al., *'Optical soft-x ray diagnostics for fluctuation diagnostics in fusión energy experiments',* Rev. Sci. Inst. **75** 10 (2009) 4020.

4) Interesting use of correlation analysis of SXR data to study structure of MHD modes in turbulent RFP plasma:

Malacarne M., Hutchinson I. H., *'SXR emission fluctuations in HBTX1A reversed field pinch',* Plasma Phys. Contr. Fus. 28 5 (1986) 823.

5) Use of SXR measurements to study the structure and stability of an internal kink mode in MAST:

Hua M.-D., Chapman I. T., Field A. R., *'Comparison of MHD induced rotation damping with NTV prediction on MAST'*, Plasma Phys. Contr. Fus., 52 (2010) 035009.