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THE KYOTO 3D SPECTROGRAPH

H. OHTANI,[1] T. ISHIGAKI,[1] T. HAYASHI,[1] S. OZAKI,[1] T. HATTORI,[1] M. SASAKI,[2] AND K. AOKI[3]
[1]Department of Astronomy, Kyoto University, Japan
[2]Simonoseki City University, Japan
[3]Data Processing Center, National Astronomical Observatory, Japan

Tri-dimensional (two in spatial and one in wavelength dimension) spectroscopy is now a common method for observations of extended objects (e.g.,Comte and Marcelin 1995). For the puropose of ob- servations of faint extended objects such as emission nebulea and galaxies, we are developing multifunc- tion tri-dimensional spectrographs.

The first generation instrument is almost completed and have been comissioned at two telescopes. This instrument has following four modes of observations which are able to be switched each other in one night (Ohtani et al. 1994);
(1) Narrow band imagery: This mode is an ordinary focal reducer camera with a reducing rate 0.27. Narrow band filters can be tilted to tune the transmission wavelenth.
(2) Spectro-Nebula-Graph: This mode is an ordinary long slit spectrograph, but will be used to obtain data cubes of extended ob- jects by scanning with the telescope. (Kosugi et al.1995). This mode is under development.
(3) Imaging Fabry-Perot Interferometer: Two Fabry-Perot (FP) etalons of Queensgate Instruments are avilable. One is a tunable filter of R= 300 for monochromatic imaging, and the other is for velocity field observtions with R=8000. Broad band coatings from 400 to 700nm are deposited on both etalons. During observations, the etalon temperature is stabilized within 1.0 degree.
(4) Microlens-Array (MLA) Intergal Field Spectrocopy: An object field is devided into 7x11 square small fields by using a microlens array,and spectra of the 77 fields are obtained simultaneously by a single exposure. Spectra of sky field well detatched from the object field are also obained simultaneously. The spectral dispersion ranges from 300 to 1000. This spectrograph has been used at the Cassegrain focus of the 1.88 m telescope of the Okayama Astrophysical Observtory and at the Ouda station of Kyoto Universiy. At Ouda,a photographic camera lens of focal length 300 mm is attached to the spectrograph as the objective lens. This system is mounted on the tube of the 0.6 m telescope, yielding a super-wide-field of view.

In Table 1, spatial resolution and field of view of the two cases are given for the Imaging Fabry Perot interferometer and the MLA Integral Field Spectrograph.

The development of the second generation instrument has been just begun and is under the phase of designing. This instrument is aimed to be used at a 2 m telescope which will be constructed at Haleakala Observatory and the 8.2 m SUBARU telescope at Mauna Kea Observaory. The basic concept of the instrument is same as that of the first generation instrument. However there are notable differences.Considering the good seeing conditions at these observatories, spatial resolutions are much finer than the first generation. Further, number of spectra of the MLA Integral Field Spectrgraph Mode is incresed to about one thousand.

For examples of observational rusults with the first generation instrument, readers should refer to the papers of Hayashi et al.and Ishigaki et al. in these proceedings.

REFERENCES

Comte, G. and Mercelin, M., 1995, Tridimensional Optical Spectroscopic Methods in Astrophysics, A.S.P. Conference Series, No.71.

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Table 1. The Kyoto 3D Spectrgraph I and II

Mode	Instrument	Telescope	Resolution (/pixel)	F.O.V. Total	F.O.V. Mono-Chrom*	No. of Spectra
FP	I	1.88 m	0.5"	4.6'	1.5'	...
		f =300 mm	0.9'	6 deg	2 deg	...
	II	2.0 m	0.3"	12'	0.7'	...
		8.2 m	0.06"	2'	7.5"	...
MLA	I	1.88 m	1.3"	9"x14"	...	77
		f =300 mm	2.5'	18'x28'	...	77
	II	2.0 m	0.4"	15"x15"	...	1000
		8.2 m	0.08"	3"x3"	...	1000

*Shift of the central wavelength is 0.1 times of the FWHM at the field center with the R=300 etalon.