BPT-sigma Relation in Nearby Dwarf Galaxies

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Abstract

In order to study the state of the galactic ISM, the intensity emission line ratios (BPT diagrams named after Baldwin, Phillips & Terlevich [1]) are used to separate main ionization sources: hot massive young OB stars in the star formation HII regions, active galactic nuclei, shock waves related with supernova remnants and other feedback processes like supersonic turbulence generated by stellar winds. In the intermediate cases, for example, when the contribution of radiation from OB stars and from shock waves mix, identification becomes uncertain, and the issue remains unresolved on what determines the observed conditions of the diffuse ionized gas including the one at large distances from the galactic plane. Adding an extra parameter - the gas velocity dispersion in the line of sight to classical diagnostic diagrams (i.e., "BPT-sigma" relations) helps to find a solution.

We announced the project aimed to expand a sample of objects to study the "BPT-sigma" relation in the interstellar medium of the local star- forming galaxies. We are going to combine the ionized gas velocity dispersion maps derived from the scanning Fabry-Perot interferometer observations at the 6-m SAO RAS telescope with the emission lines ratio obtained from the archival long-slit spectroscopic data. The first results of this study are presented.

Step 1

✓ Deriving the archival long-slit spectroscopic data (SCORPIO [2] and SCORPIO-2 [3] multimode focal reducers from ASPID in order to obtain *the emission lines ratio:* **http://alcor.sao.ru/index.php?L=en**

ASPID Archive of Spectral, Photometric and Interferometric Data

✓ *Combining the ionized gas velocity dispersion maps derived from the scanning Fabry-Perot interferometer observations at the SAO RAS 6-m telescope with this emission lines ratio.*

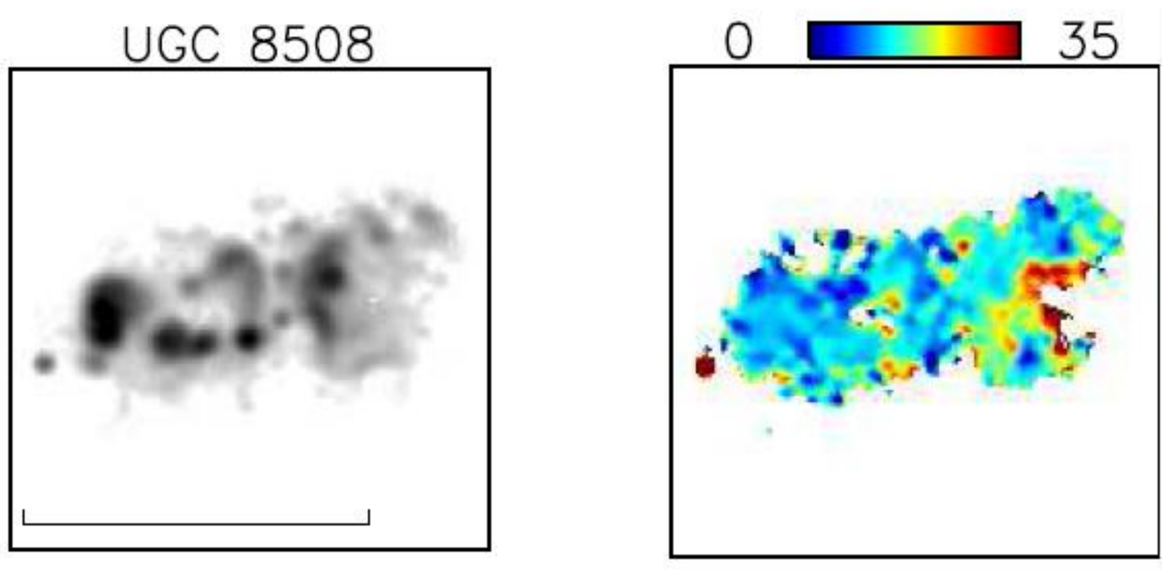

Figure 1. ***Results of observations with the scanning FPI at the 6-m SAO RAS telescope. Given for UGC 8508: image in the H_α line and velocity dispersion corrected for the thermal line broadening. Colour scale is in kms−1. The horizontal bar in the left- hand panel for this galaxy shows the linear scale of 1 kpc.***

Table 1. Objects that we intend to study

Name	Instrument	Distance (Mpc)	M_B	M_K
DDO 53	SCORPIO-2	3.56	-13.37	-15
DDO 68	SCORPIO	9.80	-15.27	-17.15
IC 10	SCORPIO	0.66	-15.99	-17.90
KKH 34	SCORPIO	8.90	-14.85	-17.20
UGC 2455	SCORPIO	7.80	-18.14	-20.00
UGC 3476	SCORPIO	7.00	-14.27	-16.62
UGC 5221	SCORPIO	3.56	-17.09	-20.27
UGC 5427	SCORPIO	7.10	-14.48	-15.50
UGC 6456	SCORPIO	4.34	-14.03	-15.72
UGC 7047	SCORPIO-2	4.31	-15.07	-17.42
UGC 7611	SCORPIO	9.59	-17.73	-20.86
UGC 7648	SCORPIO	5.80	-16.72	-18.26
UGC 7651	SCORPIO	5.80	-19.42	-21.50
UGC 8313	SCORPIO-2	9.20	-15.22	-7.94
UGC 8508 *	SCORPIO/SCORPIO-2	2.69	-13.09	-15.58
UGC 8638	SCORPIO	4.27	-13.74	-16.63
UGC 11583	SCORPIO	5.90	-14.32	-16.67
SAO 0822+3545	SCORPIO	13.50	-13.26	_
UGC 772	SCORPIO	16.30	-14.88	_
Mrk 35	SCORPIO	15.60	-17.76	-20.14
Mrk 370	SCORPIO-2	10.85	-16.83	-19.51

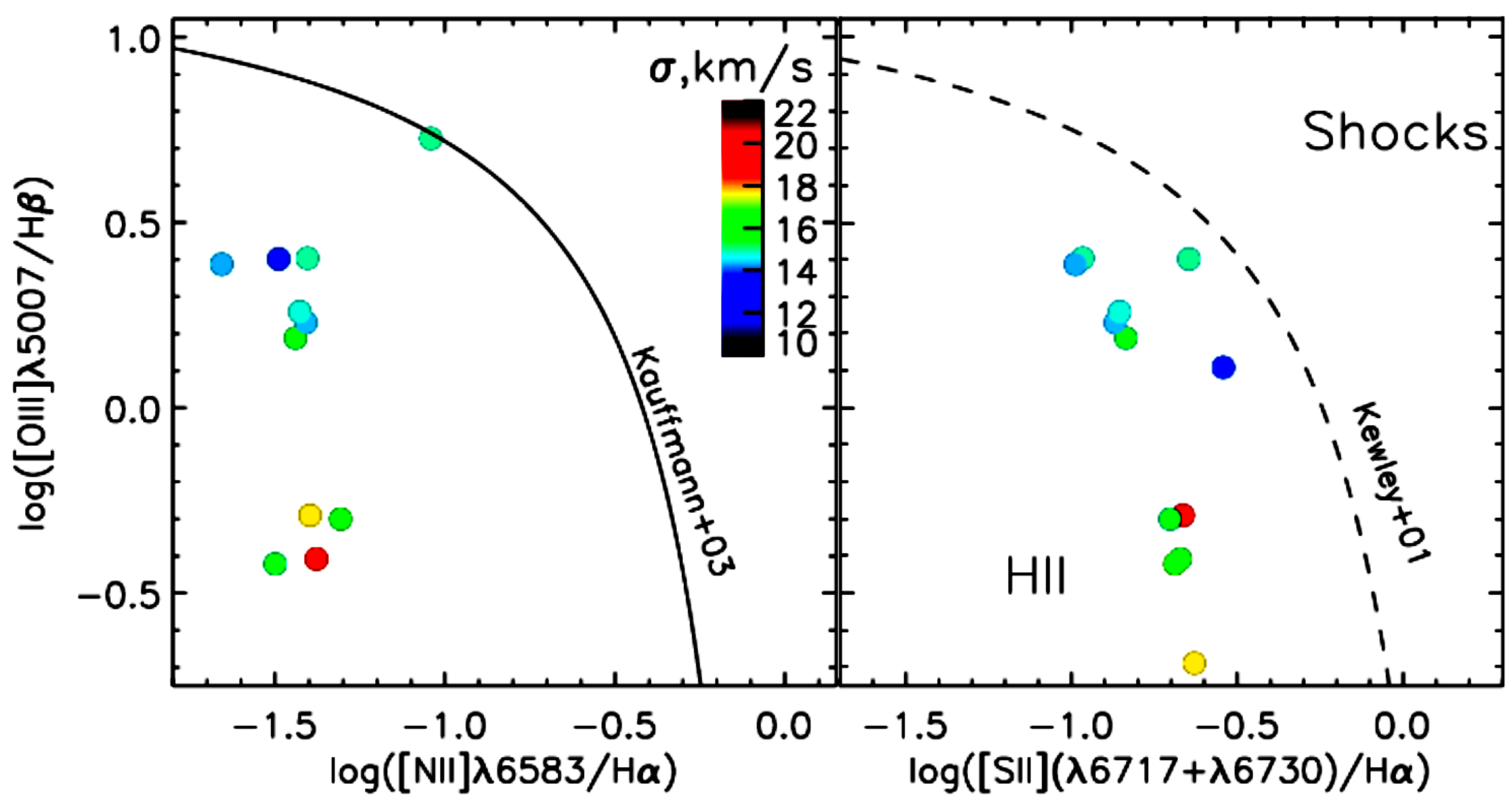

Figure 2. ***BPT-sigma relation: excitation diagnostic diagrams comparing the emission-line intensity ratios along the UGC 8508 major axis according to SCORPIO-2 long-slit observations presented in Moiseev & Lozinskaya (2012). The colored points correspond to different velocity dispersion according to the scale-box.***

References

*1. Baldwin, J. A., Phillips, M. M., & Terlevich, R. , "Classification parameters for the emission-line spectra of extragalactic objects" , PASP, **1981**, 93, 5*

*2. Afanasiev, V. L. & Moiseev, A. V. , "The SCORPIO Universal Focal Reducer of the 6-m Telescope" , Astronomy Letters, **2005**, 31, 194*

*3. Afanasiev, V. L. & Moiseev, A. V. , "Scorpio on the 6 m Telescope: Current State and Perspectives for Spectroscopy of Galactic and Extragalactic Objects" , Baltic Astronomy, **2011**, 20, 363*