

Photometry of Comet C/2012 S1 (ISON)

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Abstract. We present photometric data of Comet C/2012 S1 (ISON) observed at heliocentric distance of 6.2 - 4.6 AU. The observations were made with the 60-cm telescope Zeiss-600 (ICAMER, p. Terskol, Russia). We analyze B, V and R bands images to describe the dusty cometary coma and to investigate its brightness.

Key words: comet C/2012 S1 (ISON) – photometry

1. Introduction

C/2012 S1, also known as Comet ISON, is a sungrazing comet. The comet was discovered on September 21, 2012 at the 40-cm International Scientific Optical Network telescope (Trigo-Rodriguez *et al.*, 2013). The comet passed through the perihelion on November 28, 2013 at a distance of 0.0124 AU. This is a long period comet with inclination $i=62.3^\circ$ and $e=1.0000013$ (Williams, 2012).

2. Observations and processing

Comet ISON was observed with the telescope of the Peak Terskol Observatory (ICAMER) on September 28-30, October 1-7 and December 10-17, 2012. The CCD PixelVision Vienna camera equipped with a matrix of 1024 x 1024 pixels cooled with liquid nitrogen was a receiver. Its field of view was 10.7' x 10.7', and the image scale was 0.63" per pixel. The images of the comet were obtained with B, V and R filters. The binning of 2x2 was applied to the photometric images to increase the signal/noise ratio of the observed data. Standard bias subtraction and flat field reduction for all data were performed. All the frames with the images of the comet and standard stars were corrected for the zero-point and pixel sensitivity inhomogeneity using the master frames. To perform

an absolute flux calibration of the comet images, three field stars were used for each observation set. Observational conditions were suitable for photometry in all the nights. We used a diaphragm with the radius of 5 arcsec for the aperture photometry of stars. The information about the observations (the observation time, the number of frames, the helio- and geocentric distances) is presented in detail in Tab. 1.

Table 1. A list of the observations and photometry

Date, observation period [UT]	Frame number	$\Delta[AU]$	$r[AU]$	Filter	$M[mag]$
<i>Sep.</i> , 2012, 28 – 29	20	6.50	6.22	B	16.79 ± 0.16
	15			R	17.34 ± 0.11
	15			V	17.12 ± 0.12
<i>Sep.</i> , 2012, 29 – 30	21	6.52	6.20	B	16.74 ± 0.16
	15			R	17.24 ± 0.11
	15			V	17.03 ± 0.13
<i>Sep.</i> , 2012, 30 – 01	17	6.49	6.19	B	16.66 ± 0.14
	14			R	17.13 ± 0.11
	13			V	17.08 ± 0.13
<i>Oct.</i> , 2012, 01 – 02	19	6.47	6.18	B	16.68 ± 0.15
	15			R	17.15 ± 0.11
	17			V	16.99 ± 0.12
<i>Oct.</i> , 2012, 02 – 03	15	6.44	6.17	B	17.09 ± 0.14
	13			R	17.30 ± 0.09
	13			V	17.22 ± 0.10
<i>Oct.</i> , 2012, 28 – 29	13	6.36	6.14	B	16.76 ± 0.14
	10			R	17.27 ± 0.10
	10			V	16.98 ± 0.11
<i>Dec.</i> , 2012, 10 – 11	22	4.701	5.49	R	16.47 ± 0.05
<i>Dec.</i> , 2012, 28 – 29	11	4.58	5.43	B	16.19 ± 0.13
	11			V	16.33 ± 0.06
	11			R	16.37 ± 0.09

3. Observational results

We present photometric observations of the sungrazing comet C/2012 S1 (ISON) obtained in September-December 2012 with the broadband B, V and R filters to measure the magnitude of the comet. The upper limit of the radius of the comet, based on the photometric measurements, was found to be about 40 km. This is a very high value, which can be ascribed to the fact that calculations did not take into account any compensation of the dust coma. Moreover, the calculations depend considerably on the adopted value of albedo, which in the case of new comet ISON is likely to be very high and thus naturally leads to overestimation of its nucleus' size.

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References

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