Latest developments in Polish Fireball Network

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The Polish Fireball Network started in March 2004. Most of its observers are amateurs, members of the Comets and Meteors Workshop. The network consists of 40 continuously working stations, where nearly 70 sensitive CCTV video and digital cameras operate. The new cameras for digital meteor spectroscopy were tested. We use technology of crossed grids to have better chances to register a meteor spectrum. A resolution of 8 A/pixel + 5.5 A/pixel was achieved. For the meteor patrol we have chosen the DMK 23GX236 with a chip resolution of 1920x1200 pixels. Two new cameras will be able to cover almost the whole sky with a resolution 4'/pixel.

1 Introduction

Since 2004 the Polish sky has been patrolled by cameras of the Polish Fireball Network (PFN). Most of the PFN observers are amateurs, members of the Comets and Meteors Workshop and they perform observations from their homes. Some stations are located at astronomical clubs and schools. The network consists of 40 continuously working stations, where nearly 70 sensitive CCTV video and digital cameras operate (Olech et al., 2006).

2 Camera for meteor spectroscopy

For several years we are observing meteor spectra using DSLR cameras and analog video cameras. The results of the DSLR-cameras have a problem with the color filters imposed on the chip of the digital camera. Analog cameras, in turn, have a small resolution and poor image quality.

Recently, we tried to use small digital cameras to observe spectra. Pointgrey and QHY cameras were used for the tests. We created a housing for these cameras using 3D printing (see *Figure 1*). The parameters of the prototype cameras for observing meteor spectra are presented in *Table 1*.

Figure 1 – IMC 2013, Poznan, Poland.

We use technology of crossed grids in our cameras for meteor spectra. As a result, we have a much better chance to register a meteor spectrum without dependence on the position of the meteor relative to the field of view of the camera.

Table 1 – Parameters of the prototype cameras for observing meteor spectra.

Parameter	CGMS-1	CGMS-2
Camera	Pointgrey BlackFly 0.9M	QHY 5-LII Mono
Sensor	CCD	CMOS
Resolution	1288 x 786 (0.9 Mpix)	1280 x 960 (1.3 Mpix)
Lens	Tokina 3-8 f/1.0	Tamron Mpix 3-8 f/1.0
Focal length	4 mm	4 mm
FOV	65 deg	70 deg
LM for meteors	+1 mag	+2 mag
Diffraction grating	2 x 1000 lpm, crossed	2 x 1000 lpm, crossed
Resolution	8 A/pixel + 5.5 A/pixel	8 A/pixel + 5.5 A/pixel
LM for meteor spectra	-5 mag	-4 mag
Size	280 x 80 mm	280 x 80 mm
Weight	1kg	1kg

3 Digital HD cameras for meteor patrol

Currently, we are in a crucial moment in the history of meteor observing. The appearance of sensitive and low-cost industrial cameras freed us from the image intensifier and made video observations widespread. Now digital cameras attain a similar level of sensitivity and offer a way to observe meteors with a high resolution and an excellent digital quality. Analysis of the available

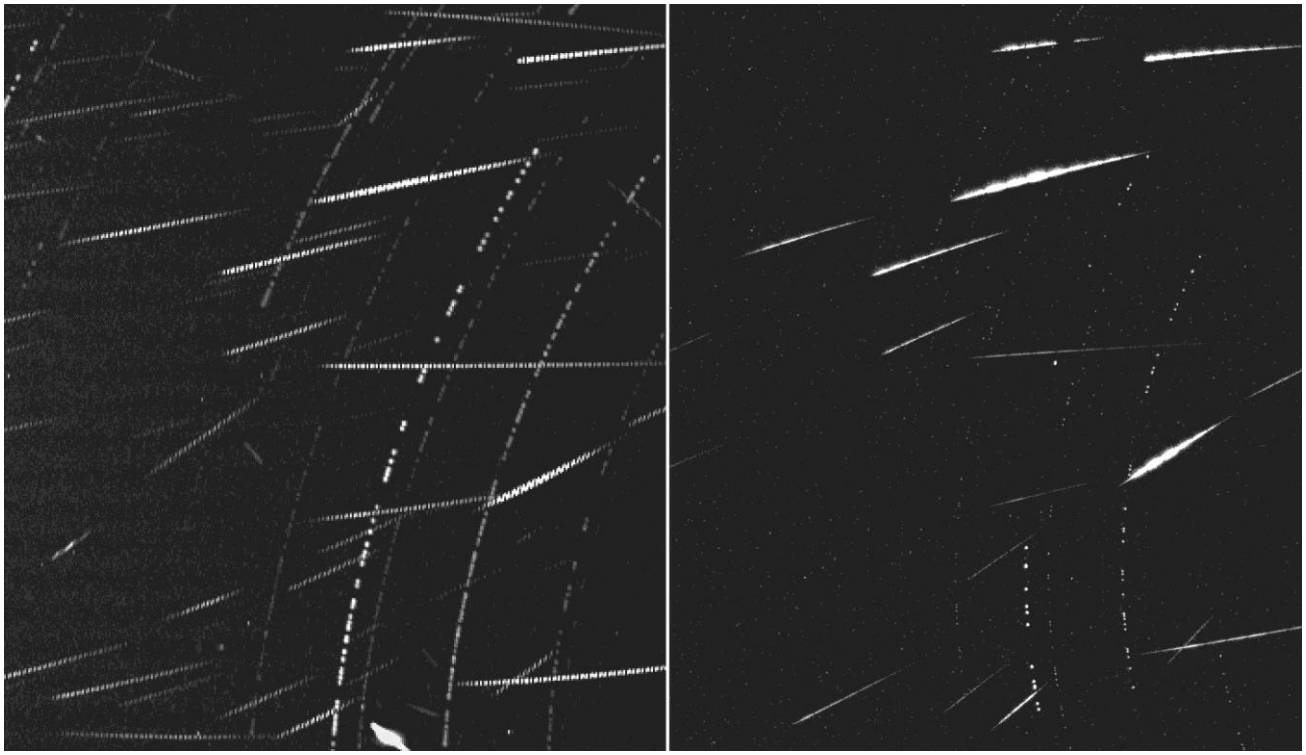

Figure 2 – Comparison of the results from analog (left) and new digital (right) systems. Both cameras were operated simultaneously on one site.

models allowed us to choose a model with which we are satisfied and represents a significant change compared to what we used up to date.

For the first set of cameras we chose the model DMK 23GX236. It has a chip with a resolution of 1920x1200 pixels. The new cameras will be working with lenses with a focal length of 2.4 mm which gives a 130°x80° field of view.

Assuming that the field of view at the observing place has often some obstacles in the FoV and then two of these cameras will be enough to patrol the skies successfully over most of each PFN station with a resolution of 4'/pixel. Compared to an all-sky with a single camera, it is an advantage to make full use of the chip of each camera and to obtain a much higher resolution.

So far PFN worked mainly with sensitive, low-cost analog industrial cameras equipped with lenses with a focal length of 4mm. A typical single camera field of view is 66 x 50 degrees. The difference in image quality between our old analog camera and the new digital system can be seen in *Figure 2*. The observation with both cameras was performed at the same place during the same time.

4 Conclusion

With the appearance of new sensitive digital cameras it became possible to increase the resolution and quality significantly to measure the brightness of the recorded meteors. During the year, we are planning an extensive modernization of the PFN network, equipping it with dozens of new digital cameras.

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References

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