

## **SOLAR RESEARCH IN POLAND**

Paweł Rudawy<sup>(1)</sup> and Janusz Sylwester<sup>(2)</sup>

*1. Astronomical Institute, University of Wrocław, Wrocław, Poland*

*2. Space Research Center, Polish Academy of Sciences, Wrocław, Poland*

### **Solar researches in Poland were carried out at the following institutions:**

- Astronomical Observatory of the Jagiellonian University
- Heliophysics and Space Research Division, Astronomical Institute, University of Wrocław, Wrocław, Poland
- Solar Physics Division, Space Research Centre, Polish Academy of Sciences, Wrocław, Poland
- Toruń Radio Astronomy Observatory

### **Heliophysics and Space Research Division, Astronomical Institute, University of Wrocław**

Scientific staff of the Heliophysics and Space Research Division of the Astronomical Institute consists of 1 professor, 2 associate professors, 5 research, 3 PhD student and 3 technicians.

Main matters of research: investigations of the energy release processes in solar flares; acceleration and propagation of the non-thermal particles in flaring structures; analysis of the dynamical processes observed in solar corona; investigations of the solar corona heating mechanisms; evolution of the solar prominences and their eruptions; high temporal resolution spectroscopy of the solar flares; evolution of the solar flares; statistical investigations of the solar activity.

Observing facilities:

Large Coronagraph (3cm/1400cm) equipped with Multi-Channel Double Pass spectrograph and a set of H $\alpha$  narrow-band filters (0.03nm, 0.05nm, 0.3nm).

Small Coronagraph (13cm/340cm) equipped with 0.3nm H $\alpha$  filter. Patrol observations.

Horizontal Telescope (15cm/500cm) equipped with 0.05nm H $\alpha$  filter or MSDP spectrograph.

Expedition on Solar Total Eclipse on 29 March 2006 in Libya

British and Polish joint team (dr. K.J.H. Phillips, MSSSL and dr. P. Rudawy, IA UW $\text{r}$ ) made observations of the total solar eclipse on 29 March 2006 from a desert camp located south

from Jalu (Libya). The expedition was supported by The British Council in Libya and The British Planetary Society with the kind help of The British Embassy in Libya.

The main scientific aim of the observations was detection of high-frequency ( $>1$  Hz) modulations of the emission arriving from the selected regions of the solar corona. The detection and analysis of the temporal variations of the coronal emission could help ones to understand total energy balance of the solar corona as well as an identification of the main heating mechanism (dissipation of the energy carried out by magnetohydrodynamic waves or multitude of the small-scale magnetic reconnections i.e. “nano-flares”).

The observations were collected using SECIS system (already used during the 1999 total eclipse in Bulgaria) but this time connected to the double 15 cm telescope on paralactic mount. The collected observational material is being analyzed now.

### **Solar Physics Division, Space Research Centre, Polish Academy of Sciences**

Staff: 1 professor, 2 associate professors, 1 research, 1 PhD student, 4 engineers, 1 physicist

Web page: [www.cbk.pan.wroc.pl](http://www.cbk.pan.wroc.pl)

Publications available at: <http://www.cbk.pan.wroc.pl/publikacje.htm>

Main research topics: analysis of space borne measurements with the emphasis on *Yohkoh*, *TRACE*, *Coronas-F* data. Special interest is focused on the analysis of the data from two Polish Bragg spectrometers RESIK and Diogeness operating between 2001-2003 from the *CORONAS-F*.

Main activities/results: RESIK absolute calibration and data reduction are in progress. The construction of the spectral variability atlas in the range 3.3Å - 6.1Å has been finished and the spectra published. Determination of absolute Cl abundance has been performed, for the first time in the corona (RESIK). Determination of flare plasma composition for Al, Si, S, Cl, Ar and K has been made. Determination of physical conditions in compact coronal plasma kernels (*Yohkoh*: SXT & HXT) has been performed. Determination of TRACE point spread function for 171Å and 195 Å filters (now part of the SolarSoft) has been performed and made available to the public.

The construction work: the new project SphinX (Solar Photometer IN X-rays) is under development in cooperation with FIAN (Russia), MEPhI (Russia) and AI CAS, Ondrejov (Czech Rep.). The instrument carries four Si-PIN detectors to cover 0.5-15 keV energy band in 256 intervals with unprecedented temporal resolution. The aim is to study multi-band solar variability with sub-sec sampling, coronal plasma composition variability and the flare heating. Sensitivity of SphinX is to be one order of magnitude higher than available at present. The flight units are in the production, *CORONAS* satellite launch is expected in 2008.

## **The Astronomical Observatory of the Jagiellonian University**

No staff changes.

The patrol observations of the fluencies of the solar radio emission are recorded at 11 frequencies (from 275 MHz up to 1755 MHz). The following investigations are performed using the collected data: long time series analysis; research on basic and slowly varying radio component; study of radio emission from active regions.

The data are collected using the 8 meter, polar mounted parabolic antenna. A spiral feeder (left polarisation) of the Watkins-Johnson brand is mounted in the primary focus of the antenna along with a box containing pre-amplifiers and calibration circuits. The receiver is a Hewlett-Packard spectrum analyser working in ten channels in a linear regime, each channel with a bandwidth of 5 MHz and the frequencies span from 275 MHz up to 1755 MHz. The solar flux is recorded every 11 seconds. Results of 11-sec temporal resolution are available near-on-line (with 10-min time lag) at: <http://www.oa.uj.edu.pl/slonce/index.html>.

## **Torun Radio Astronomy Observatory**

No staff changes.

Activity: a routine spectral daily measurements of the solar flux density are performed at 127 MHz. Web page: <http://www.astro.uni.torun.pl/>