

НОВ БЪЛГАРСКИ УНИВЕРСИТЕТ

Департамент Информатика

**Астроинформатика:**

**Синтез между астрономическото изобразяване и  
информационните & комуникационни технологии**

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## **Astroinformatics:**

### **A Synthesis between Astronomical Imaging and Information & Communication Technologies**

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The newly born area of **Astroinformatics** has emerged as an interdisciplinary area from Astronomy and modern information and communication technologies, based on the modern Internet developments. Recently, four institutes of the Bulgarian Academy of Sciences launched a joint project called **Astroinformatics** and aimed at the development of the necessary methods and techniques. As a truly interdisciplinary area **Astroinformatics** has arisen from the need of ICT methods for preservation and exploitation of the scientific, cultural and historic heritage of astronomical observations. The Wide-Field Plate Data Base is an ICT project of the Institute of Astronomy, which has been launched in 1991, by the Working Group “Wide-Field Sky Surveys” of the International Astronomic Union and is unique by its nature at the international level. So far 150 000 plates have been already digitized through several European research programs. As a result, image-data is collected with about 2TB size and it tends to rise up to 1PB. The access, manipulation and science data-mining of such a huge amount of information is a serious challenge for the ICT community and the efforts in this direction are funded by European scientific programs as COST Action 283, FP6 & FP7 of the European Virtual Observatory, the Humboldt Foundation of Germany, and recently, by the Bulgarian National Science Foundation.

Министерство на образованието и науката  
Фонд Научни изследвания

ДО-02-275/2008

Астроинформатика: Обработка и анализ на дигитализирани астрономически данни и web-базирано приложение  
ст.н.с. I ст. дмн Огнян Кунчев, Институт по математика и информатика,  
БАН

ДО-02-273/2008

База от данни за широкоъгълни фотографични астрономически наблюдения: развитие и достъп чрез Интернет  
ст.н.с. II ст. д-р Милчо Цветков, Институт по астрономия, БАН

- съхраняване и предоставяне на достъп до дигитализирани астрономически наблюдения
- прилагане на ИКТ стандартите на Виртуалната обсерватория за платформено независим достъп
- създаване на уеб-базирани инструменти за търсене на обекти в дигитализирани наблюдения
- адаптиране на методи за анализ, компресия, уеб-достъп и обработка на изображения
- разпространение на опита на екипа сред специалисти в ИКТ и астрономията

# Астрономически изображения

- История по света

*The first astrophoto is attributed to John William Draper, who took a photo of the moon in 1840. His son, Henry Draper, later became the first person to photograph the Orion Nebula in 1880, which was essentially the first deep sky astrophoto.*

- История в България

*През 1892 г. започва строителството на Астрономическата обсерватория извън пределите на София. Тогава днешната Борисова градина е пасище на село Слатина. Старото здание и големият купол са завършени през 1894 г.*

*Националната астрономическа обсерватория Рожен е открита официално на 13.03.1981 г. Тя е най-голямата еднократна инвестиция на България в научна инфраструктура (над 12 млн. лв) и все още е най-голямата астрономическа обсерватория на Балканите и въобще в този район на Югоизточна Европа.*

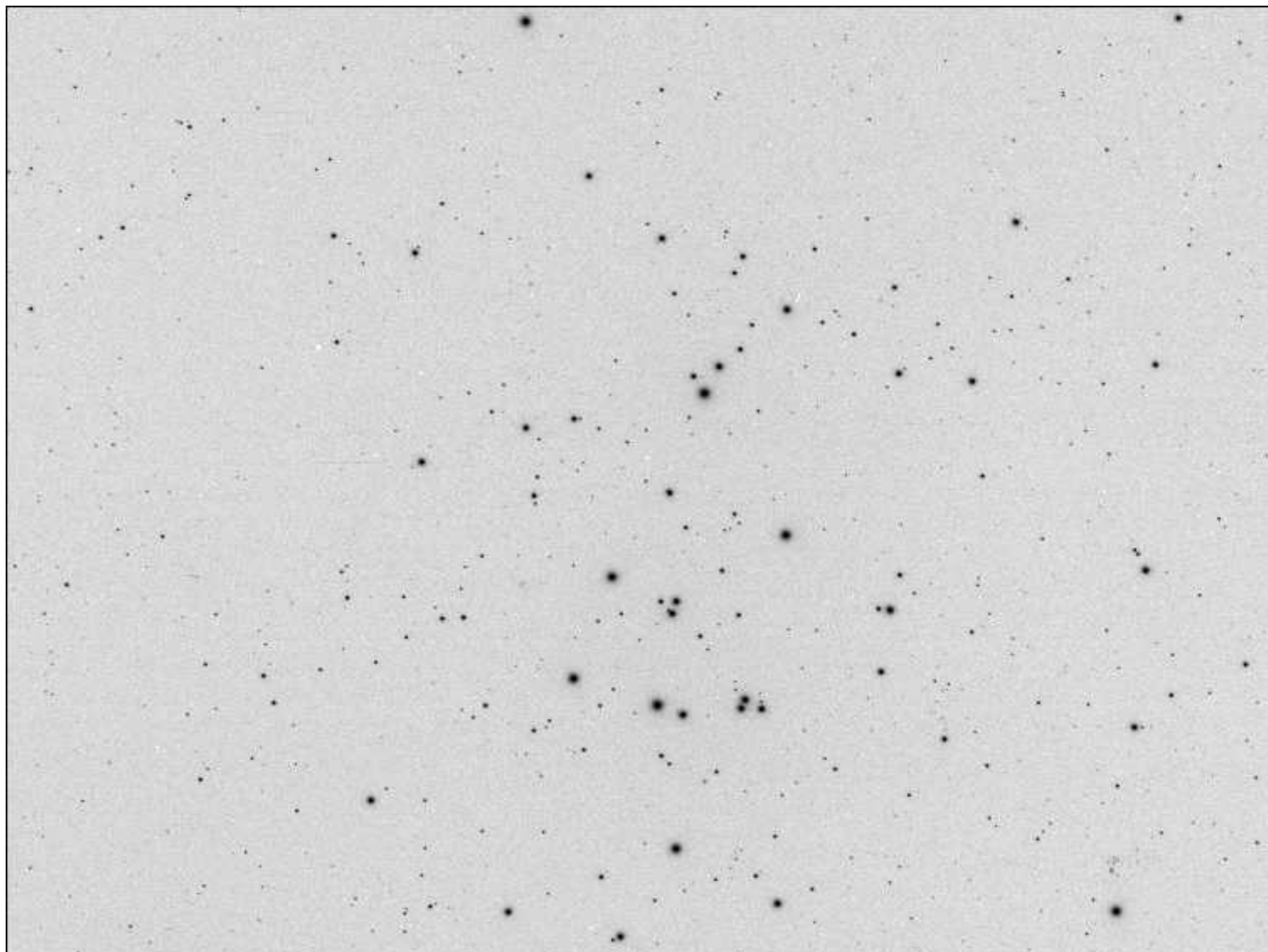
- Използване на архивни астрономически фотографични плаки – над 2 милиона (Космос – звезди, планети; Земя – GPS)

## Проблеми и задачи

- Търсене и намиране на конкретно изображение (идентификация)
- Качество и използваемост на плаката (формати на данните)
- Пренасяне на данните през Интернет (компресия, частично)









## Астрономически дневници

- Описание
- Дигитализация
- Методи за обработка

INSTRUMENT 24 = B.... DATE Wednesday, June 20, 1894

| No. | Class. | Object. | R.A.  | Dec.                | Started. | Obs.H.A. | Obs.Dec.            | Enl.  | Stopped. |
|-----|--------|---------|-------|---------------------|----------|----------|---------------------|-------|----------|
| 688 | -      | 5 ...   | 15 12 | +2 <sup>0</sup> .5  | 14 47    | 0 25e    | +2 <sup>0</sup> .5  | 15 17 | 15 47    |
| 689 | -      | Nova... | 16 54 | -12 <sup>0</sup> .7 | 15 58    | 0 56e    | -12 <sup>0</sup> .7 | 16 28 | 16 58    |

# Harvard College Observatory

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INSTRUMENT, ST ROSS - REI

| No.    | Class | Object | R. A. | Dec. | Started | Obs. H. A. | Obs. Dec. | Tel. E. or W. | Load | Focus | Prisms |
|--------|-------|--------|-------|------|---------|------------|-----------|---------------|------|-------|--------|
| ✓ 1917 | L     | -      | 19 00 | 0    | 17 30   | 30E        | 0         | -             | 88   | -     | -      |
| ✓ 1918 | "     | -      | 19 30 | -60  | 19 02   | 28E        | -60       | -             | 110  | -     | -      |
| ✓ 1919 | "     | -      | 21 00 | 0    | 20 34   | 26E        | 0         | -             | 90   | -     | -      |
| ✓ 1920 | "     | -      | 22 30 | -60  | 22 06   | 24E        | -60       | -             | 110  | -     | -      |
| ✓ 1921 | L     | -      | 20 00 | -45  | 20 15   | 15W        | -45       | -             | 104  | -     | -      |
| ✓ 1922 | "     | -      | 22 00 | -45  | 21 47   | 13E        | -45       | -             | 105  | -     | -      |
| ✓ 1923 | L     | -      | 14 00 | -35  | 14 09   | 09W        | -35       | -             | 125  | -     | -      |
| ✓ 1924 | L     | -      | 16 30 | -60  | 15 41   | 0          | 49E       | -60           | 110  | -     | -      |
| ✓ 1925 | L     | -      | 17 00 | 0    | 17 15   | 0          | 15W       | 0             | 88   | -     | -      |
| ✓ 1926 | L     | -      | 14 00 | -45  | 14 55   | 0          | 55W       | -45           | 103  | -     | -      |
| ✓ 1927 | "     | -      | 16 00 | -45  | 16 27   | 0          | 27W       | -45           | 104  | -     | -      |
| ✓ 1928 | "     | -      | 18 00 | -45  | 17 59   | 0          | 01E       | -45           | 104  | -     | -      |
| ✓ 1929 | "     | -      | 19 00 | 0    | 19 31   | 0          | 31W       | 0             | 88   | -     | -      |
| ✓ 1930 | "     | -      | 21 00 | 0    | 21 03   | 0          | 03W       | 0             | 88   | -     | -      |
| ✓ 1931 | "     | -      | 0 00  | -35  | 22 35   | 1          | 25E       | -78           | 118  | -     | -      |

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DATE, July 17-18 (Fri-Sat.) 1931

| Sky at Start | Stopped | Exp. Crds | Clk | Dew | Ref. | Obs'r | REMARKS      |
|--------------|---------|-----------|-----|-----|------|-------|--------------|
| 0            | 19 00   | 90        | -   | -   | -    | V     |              |
| 0            | 20 32   | 90        | -   | -   | -    | V+5   |              |
| 0            | 22 04   | 90        | -   | -   | -    | S     |              |
| 0            | 23 36   | 90        | -   | -   | -    | S     | Dew on lens. |

July 19-20 (Sun-Mon.) 1931

|    |       |    |   |   |   |   |                             |
|----|-------|----|---|---|---|---|-----------------------------|
| .1 | 21 45 | 90 | - | - | - | V | Lightning right round in E. |
| 0  | 23 17 | 90 | - | - | - | V | Damp. lens wet with dew.    |

July 20-21 (Tues-Wed.) 1931

|    |       |    |   |   |   |   |  |
|----|-------|----|---|---|---|---|--|
| .1 | 15 39 | 90 | - | - | - | D |  |
| .2 | 17 11 | 90 | - | - | - | D | Circi in South and West.   |
| .5 | 18 16 | 90 | - | - | - | D | Circi forming, passing over, dissipating, forming again etc.<br>→ Wellen & stationary. They practically overcast with circi. |

July 21-22 (Thurs-Frid.) 1931

|    |       |    |   |   |   |   |                                      |
|----|-------|----|---|---|---|---|--------------------------------------|
| .2 | 16 25 | 90 | - | - | - | V | blonds in N. Moon 6 <sup>d</sup> .   |
| .2 | 17 57 | 90 | - | - | - | V | " " " "                              |
| .1 | 19 29 | 90 | - | - | - | V | " " " "                              |
| 0  | 21 01 | 90 | - | - | - | V | blonds 6 <sup>d</sup> Moon set 20.02 |
| 0  | 22 33 | 90 | - | - | - | F |                                      |
| 0  | 24 06 | 90 | - | - | - | F |                                      |

## Overview of accessible logbooks

| Observatory | WFPDB ID | Plates | Plates in WFPDB | Logbooks No | Data GB | Digitized Logbooks |
|-------------|----------|--------|-----------------|-------------|---------|--------------------|
| Harvard     | HAR      | 484668 | 111665          | 75          | 44      | Yes                |
| Potsdam     | POT      | 8415   | 1661            | 11          | 1       | Yes                |
| Jena        | JEN      | 1100   | 0               | 1           | 4       | Yes                |
| Bonn        | BON      | 10530  | 0               | 9           | 0       | No                 |
| Rozhen      | ROZ      | 9152   | 9332            | 2           | –       | Partially          |
| Bamberg     | BAM      | 30535  | 24914           | 32          | –       | Partially          |
| Vatican     | VAT      | 7936   | 0               | 4           | 0       | No                 |
| Copenhagen  | COP      | 1364   | 0               | 1           | 0       | No                 |

Сайт на проекта Астроинформатика: [astroinformatics.eu](http://astroinformatics.eu)

WIDE-FIELD PLATE DATABASE - Sofia: [www.skyarchive.org](http://www.skyarchive.org)

The European Virtual Observatory: [www.euro-vo.org](http://www.euro-vo.org)

International Virtual Observatory Alliance: [www.ivoa.net](http://www.ivoa.net)

German Astrophysical Virtual Observatory (GAVO): [www.g-vo.org](http://www.g-vo.org)

GAVO - Astrophysical Institute Potsdam Archive of historic CdC scans:  
[vo.aip.de/plates/picindex.html](http://vo.aip.de/plates/picindex.html)

Harvard-Smithsonian Center for Astrophysics, Harvard Observatory Plate  
Stacks, MC Series Characteristics:  
[tdc-www.harvard.edu/plates/mc/](http://tdc-www.harvard.edu/plates/mc/)

Google: [astroinformatics](http://astroinformatics)

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