100 years of Astronomical Institute on Sváb hill

Lajos G. Balázs
ELKH CSFK KTM CSI
ELTE Dept. Of Astr.

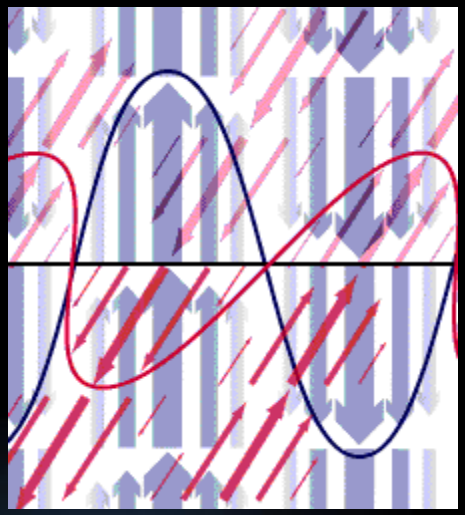
"Knowledge ..."

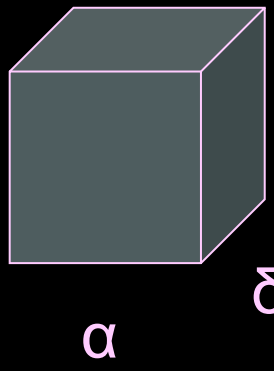
Prelude

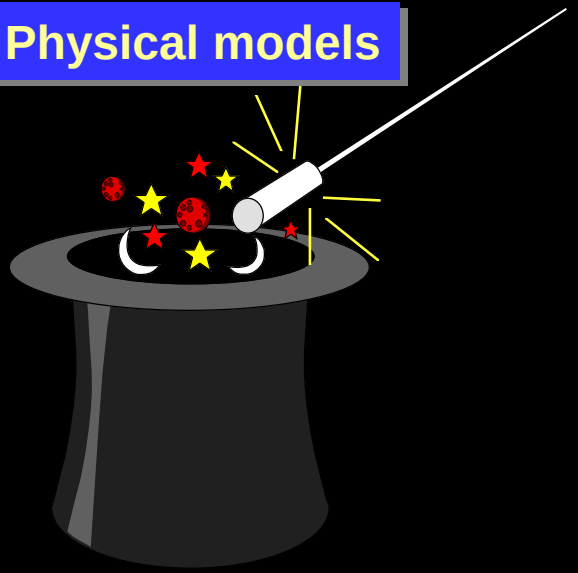
Nature of astronomical information

Information from the Cosmos: > 99.9 % electromagnetic rad.

Incoming radiation → **Observed data** → **Physical models**







Photon properties ***n (direction)*** ***λ (wavelength)*, *polarisation***

Tipically (α, δ, λ) data
Historically α, δ : positional astronomy

Prelude (cont)

- 1842: birth of Miklós Konkoly Thege
- 1859: Kirchhoff & Bunsen - spectral analysis - Revolution of astrophysics
- 1871: Private Observatory of Konkoly Thege - main profile: astrophysics

From this time on, thanks to this foundation there has been a continuous scientific activity of internatrional reputation in Hungary in astronomy.

‘Magyar Kir. Astrophysikai Obs’. (Royal Hung. AO)

Donation: May 16, 1899

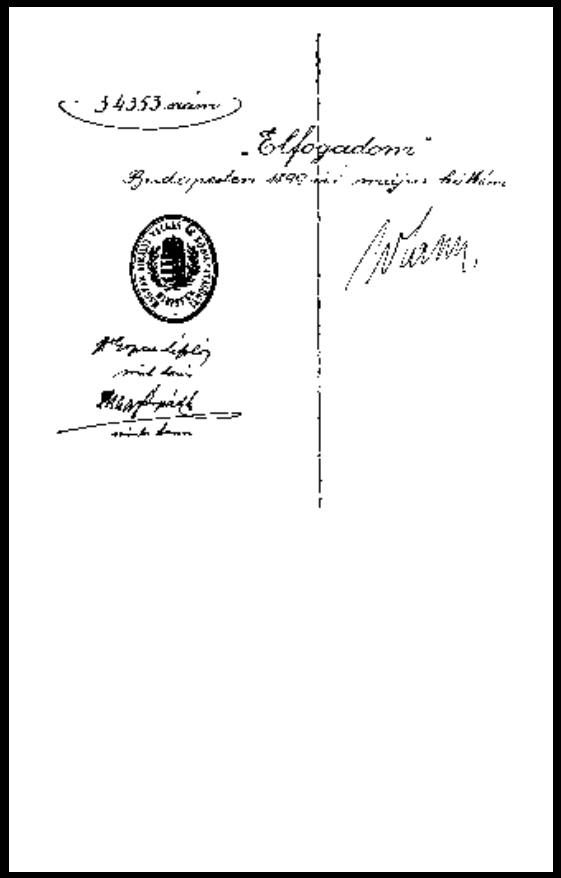
Inauguration : May 20, 1899

Director : Dr. Konkoly Thege, Miklós

Dep. Director: Dr. Kövesligethy, Radó

Observer: baron Harkányi, Béla

Assistents : Tass, Antal
Szántó, Béla



The Svábhegy Observatory

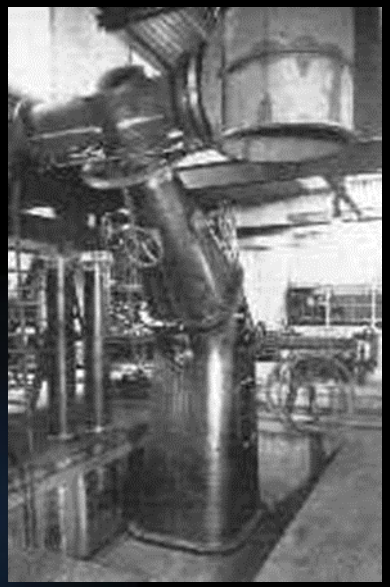
November, 1918: collapse of monarchy

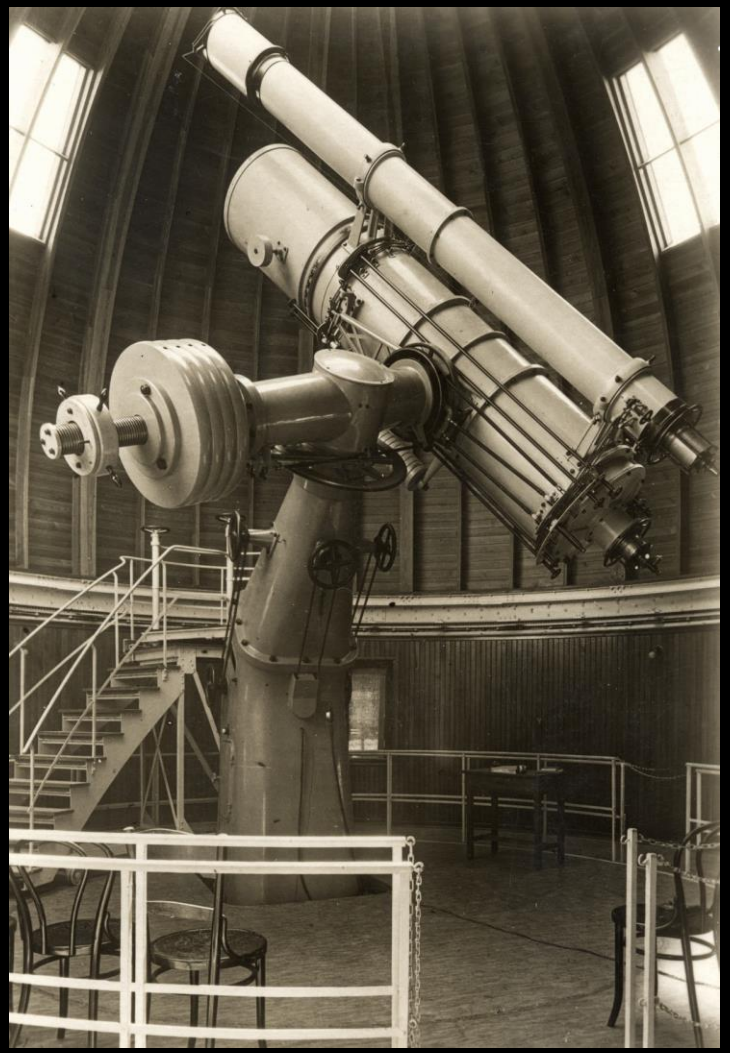
1921 : decision on a new institute

First buildings: small dome, passage house - fall, 1922: start of observations

Main building: 1924-26
Big dome + 60 cm telescope: 1927-28

1928: 60cm telescope, Budapest





The Svábhegy Observatory (2)

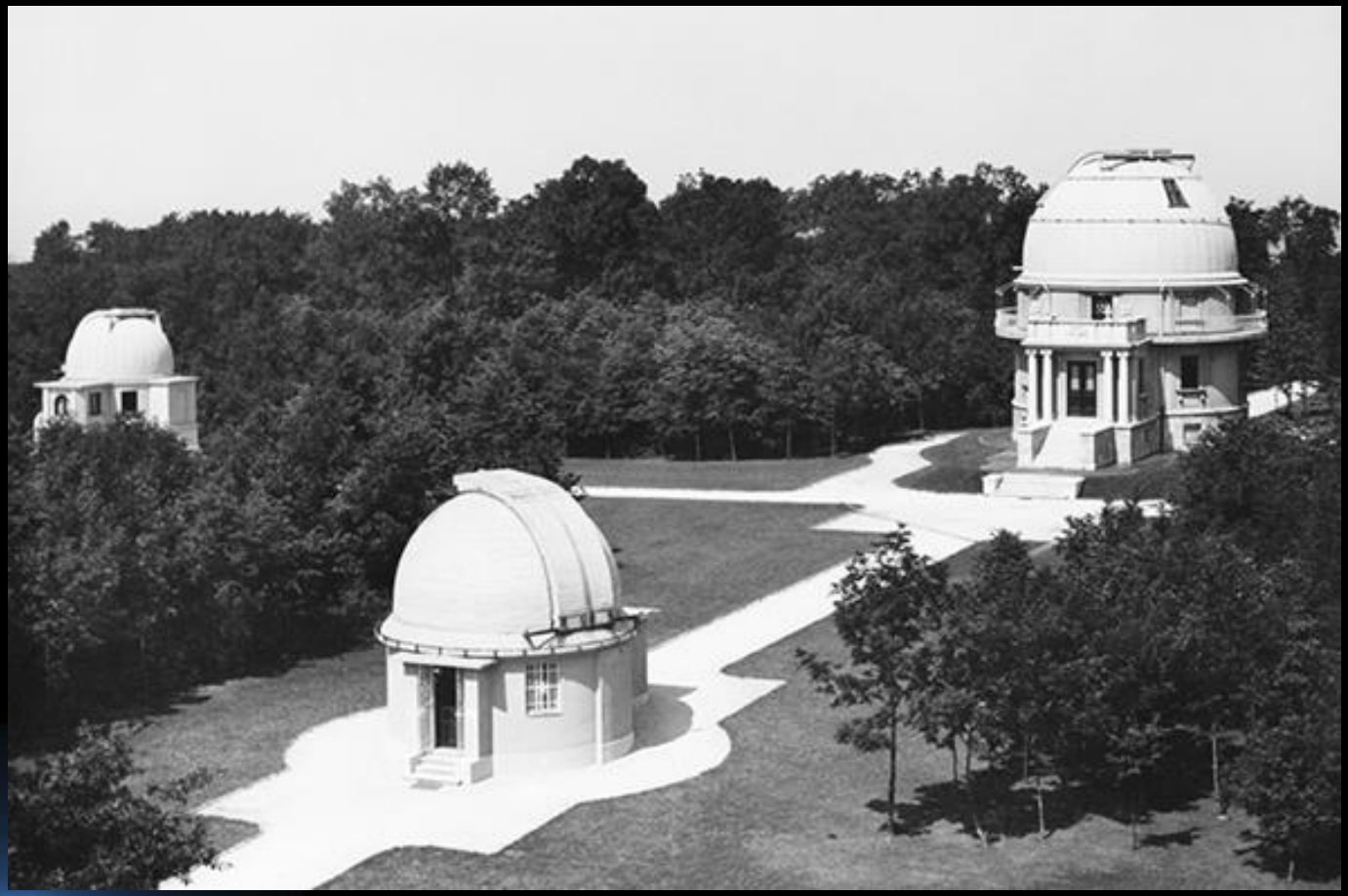
1923 : Director
Tass, Antal

Main program : variable stars
visual and photographic photometry

60 cm telescope - successful minor planet research :
22 independent discovery

1934 : the institute joined the Pázmány Péter University
of Sciences, Budapest

The Svábhegy Observatory (3)



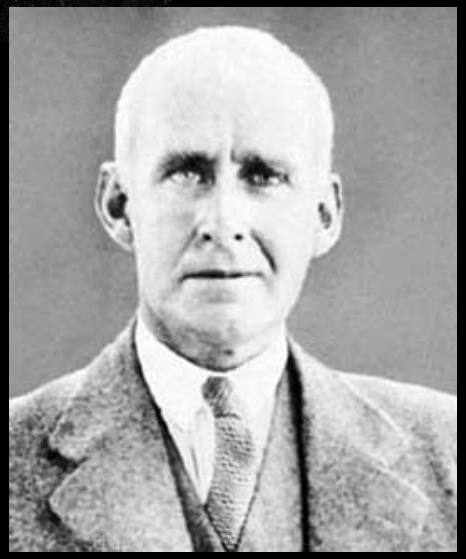
Start of international relationships

Aug. 08-13, 1930. **AG assembly, Budapest**

Among guests: Sir Arthur Eddington,

Otto Struve

Problem of stellar energy production



1926. The Internal Constitution of the Stars theoretical confirmation of

$$P\sqrt{\rho} = const$$

(Ritter; A., 1879)

Energy production is NO gravitational contraction

***δP* at δ Cephei would be 17 s/year**

Need for a stable energy resource: H → He fusion

Sir Arthur Stanley Eddington (1882 – 1944)

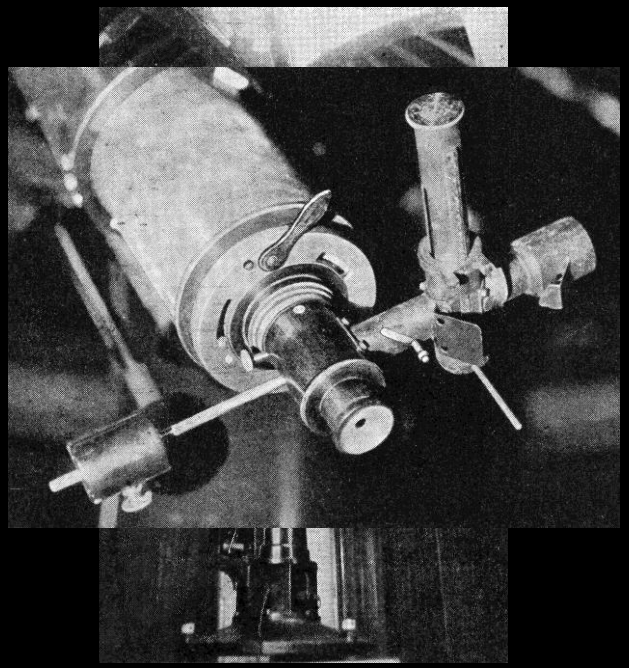
Pulsating variables of short period : Test objects for stellar evolution and energy production

1931. László Detre changed research field in the Institute

Start of variable star research

1931. László Detre started to investigate the changes of light curves and periods of cepheid variables

Used equipment: Graff wedge photometer on 20 cm Heyde refractor



1932-34: First results

Die Lichtkurve von RU Piscium. Von *L. Detre*.

Die Veränderlichkeit dieses Sternes (= BD + 23°159) wurde von Miss *Leavitt* auf Harvard Platten entdeckt (Harv. Bull. 790, 1923). Für die Extremwerte des photographischen Lichtwechsels sind $9^m.9$ bzw. $10^m.5$ angegeben. 220 visuelle Schätzungen von *Lange* und *Zessewitsch* ergaben RR Lyrae-artigen Lichtwechsel und die angenäherten Elemente

Min. hel. = J. D. m. Z. Gr. 2424010.491 + $0^d.3898 \cdot E$

mit der Amplitude $9^m.1$ bis $10^m.5$ (AN **223**.151, 1925). Eine Lichtkurve des Veränderlichen wurde bis jetzt nicht publiziert.

Meine Beobachtungen sind in den Jahren 1931–33 mit

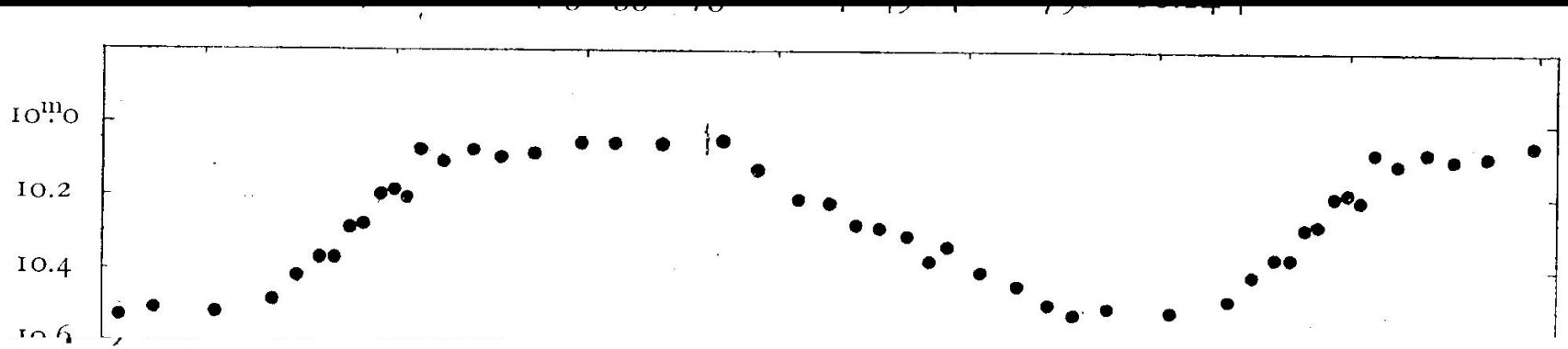
($9^m.16$), +22°204 ($7^m.52$) mit der Harvard-Größen bestimmt.

Insgesamt wurden in 37 N erhalten. Eine Beobachtung beste an den Vergleichsternen und zwe Veränderlichen nach dem Schema *a* am J. D. 2426620 erstrecken sich Periode. Zur Bestimmung der Län die Beobachtungen auf dem auf kurve benutzt und diese führten z

Max. hel. = J. D. m. Z. Gr. 242

Meine Beobachtungen sind in den Jahren 1931–33 mit einem Graffschen Keilphotometer am 20 cm-Heyde-Refraktor ausgeführt. Als Vergleichsterne dienten:

Light curve of RU Piscium



Das vorliegende Beobachtungsmaterial ist geeignet dazu, die eventuelle Veränderlichkeit der Lichtkurve oder der Periode zu untersuchen. Diese Frage wird später, gemeinsam mit den übrigen hier unter Beobachtung stehenden RR Lyrae-Sternen (SW Andromedae, W Canum venaticorum, RZ Cephei, XZ Draconis, RR Leonis) diskutiert werden.

Astronomical Institute of HAS

1946 : Decision on establishing the Dept. of Solar Phys.

1947 : Foundation of Urania popular observatory with 20 cm Heyde refractor

1947 : Normalizing relationships to IAU

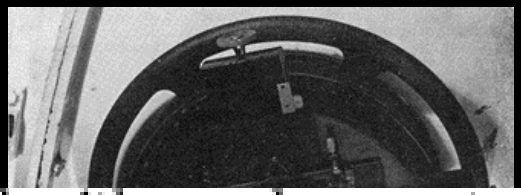
1948 : again at the Ministry of Education

1951 : Decision of Council of Ministers: Astronomical Institute of HAS

1952 - 54 : Dept. of Positional Astronomy and Stellarstatistics

Astronomical Institute of HAS (2)

1951:start of photoelectric photometry



MITTEILUNGEN
DER
STERNWARTE
DER UNGARISCHEN AKADEMIE
DER WISSENSCHAFTEN

ИЗВЕСТИЯ
АСТРОНОМИЧЕСКОЙ
ОБСЕРВАТОРИИ
АКАДЕМИИ НАУК
ВЕНГРИИ

BUDAPEST—SZABADSÁGHEGY

Nr. 29.

PHOTOELECTRIC OBSERVATIONS OF THE 1950 ECLIPSE OF ZETA AURIGAE

by

L. DETRE and T. HERCZEG

The eclipse of the B-type component in the remarkable binary system ζ Aurigae occured for the last time in 1950 August and September. On this

and with a galvanometer of low sensitivity. The multiplier phototube was presented us by Dr. *H. Shapley*, Director of the Harvard Observatory, at the Zürich meeting of the I. A. U., 1948. The equipment will be described in another paper of this series.

Astronomical Institute of HAS (3)

Main research program : light curve variations of RR Lyrae variables, Blazsko effect (for 50-es two decades of observations)

Solar phys. : observation of sunspots and prominences

1956 : International variable star conference, Budapest

1956: emigration of young skilled researches

1958 : start of regular observations of artificial satellites

1961 : task from IAU - Information Bulletin on Variable Stars

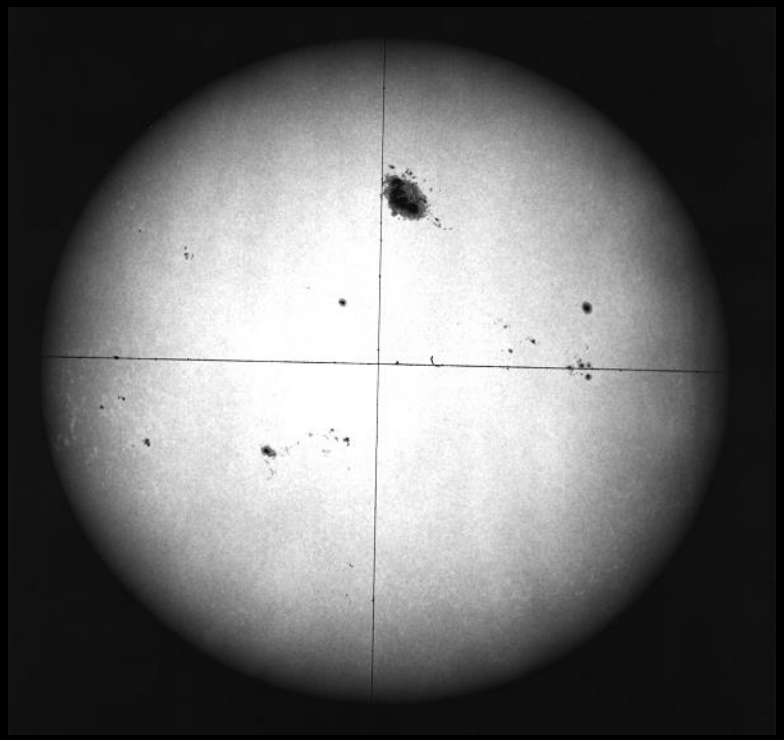
Solar Physics in Debrecen

Jan. 1, 1958: Solar Physical Observatory of HAS in Debrecen in the former universiry observatory

Main program: motion of sunspots

1973 : New big investment
53 cm coronograph

1976 : Greenwich sunspot catalogue in Debrecen

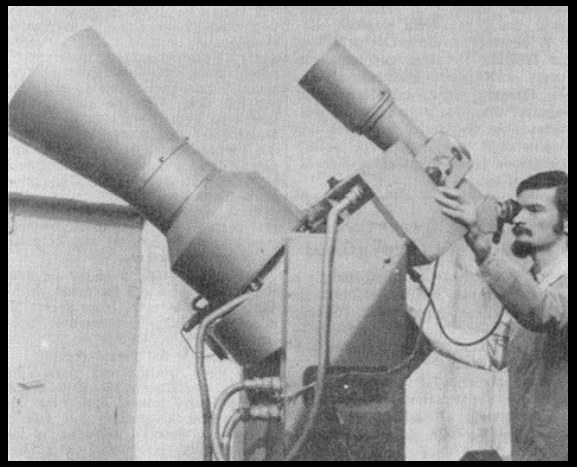


Solar Physics in Debrecen

Conquest of the space

Astronomical instititute at Baja

AFU-75 camera



- **1957. Astrosoviet requested observations - orbit elements**
- **INTERCOSMOS cooperation among socialist countries**
- **1965. COSPAR had 2 Hungarian members**
- **1966. joining the station at Baja – increasing financial resources and international conections**

Station at Piszkéstető

Revolutionary development in the technique of observations:
photomultiplier (linearity, high quantum efficiency)

1948 :gift of Harlow Shapley - RCA 1P21
from 1950: photoelectric observations with 60 cm telescope

1953 : Order of a new telescope from Zeiss - 60/90 cm Schmidt

1958 : Council of Ministers approved 9 Mill. Ft for a new station in the Matra mountain (120 km NE from Budapest)

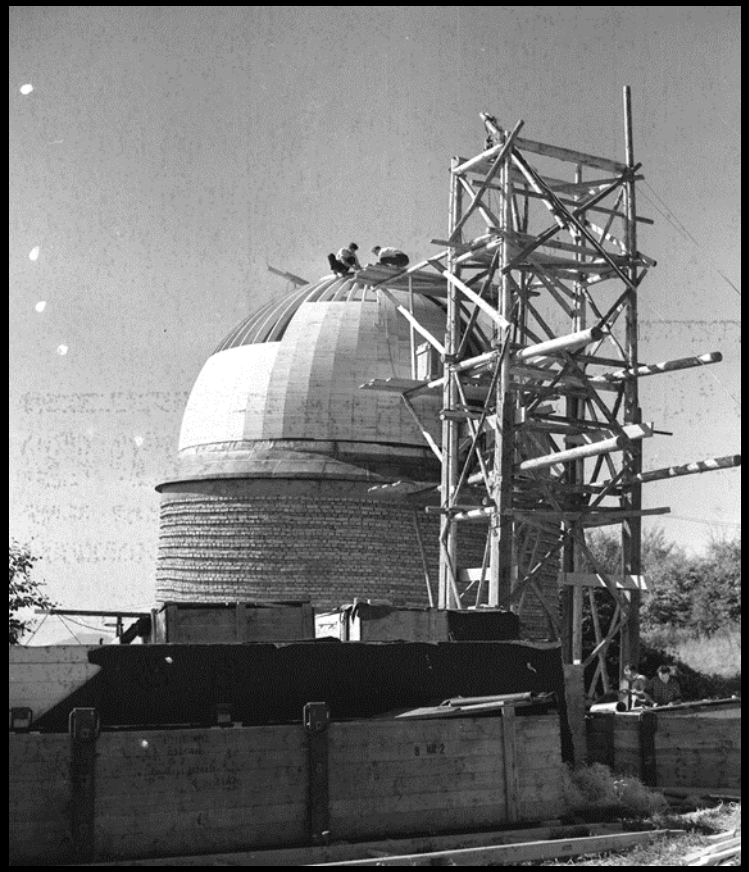
Station at Piszkéstető (2)

March, 1959. - Site selection

1959-60. Construction of the main building

- **1948. Changing the political system – basic changes in the administrative framework of sciences**
- **New possibilities offered by wide field telescopes**
- **1951. Institute's proposal for a 90 cm mirror 1:3 focal ratio 3x3 FoV Sonnefeld type telescope**
- **1952. It was ordered but modified with a 60/90/180 cm Schmidt type telescope.**
- **1958. The government allocated 9 million forint (~ 3 million Euro)**
- **Sept. 8, 1960. The handover of the main bulding**

Station at Piszkéstető (3)



Building Schmidt dome

Station at Piszkéstető (4)

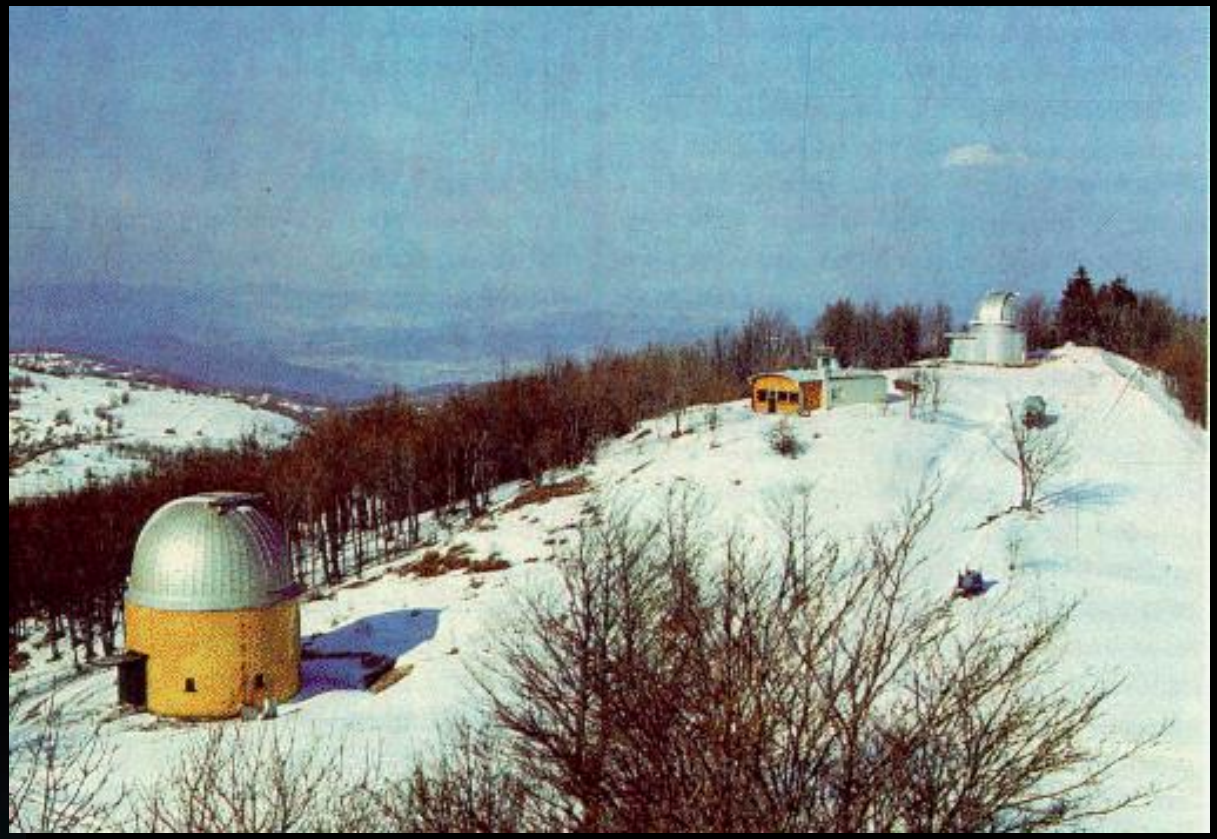
Mounting Schmidt telescope

Station at Piszkéstető (5)

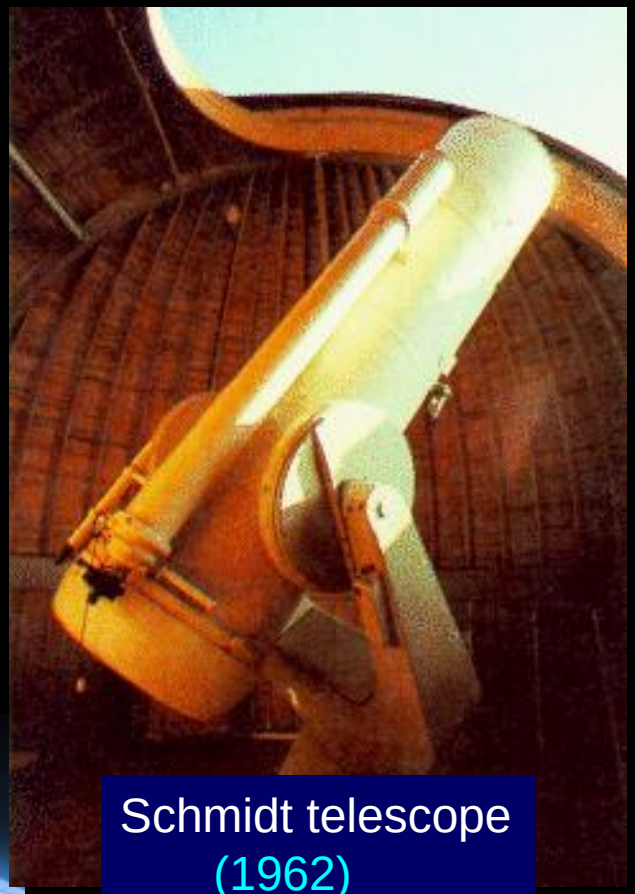
50 cm dome
(1966)

Seismology
(1962)

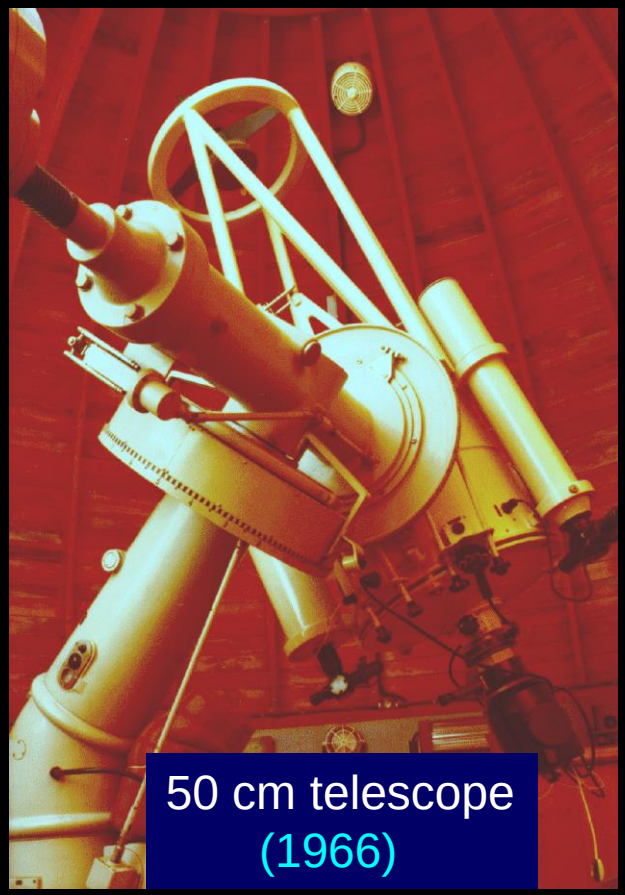
Schmidt dome
(1961)



Station at Piszkéstető (6)



Schmidt telescope
(1962)



50 cm telescope
(1966)

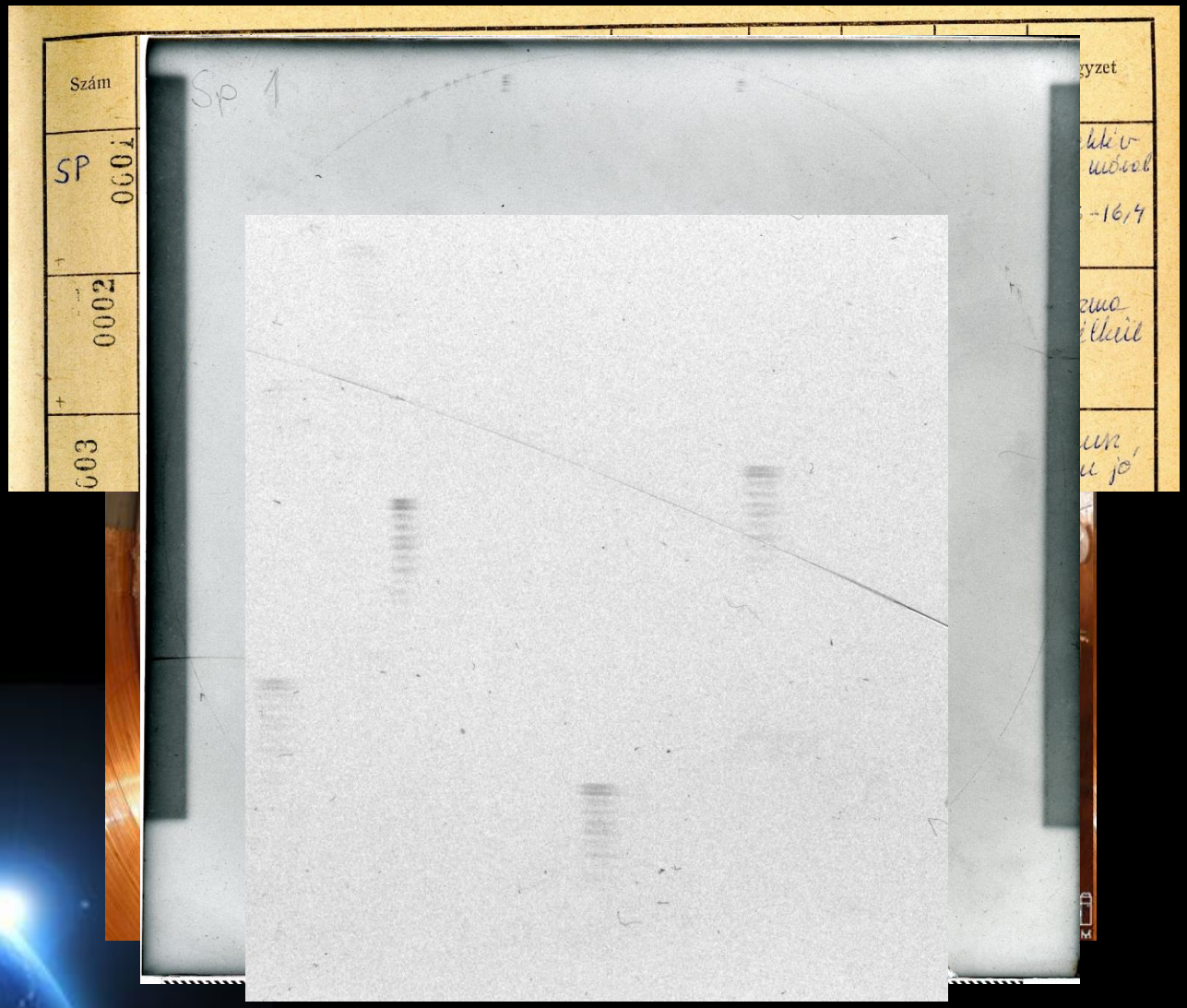
Replaced recently by
a 80 cm RC telecsope

Station at Piszkéstető (7)

1 m dome

1 m RCC telescope
(1974)

The „first light”: June 15,1962.



New science cases

(wide field of 5^o diameter: statistical studies)

Solar system:

- tails of comets

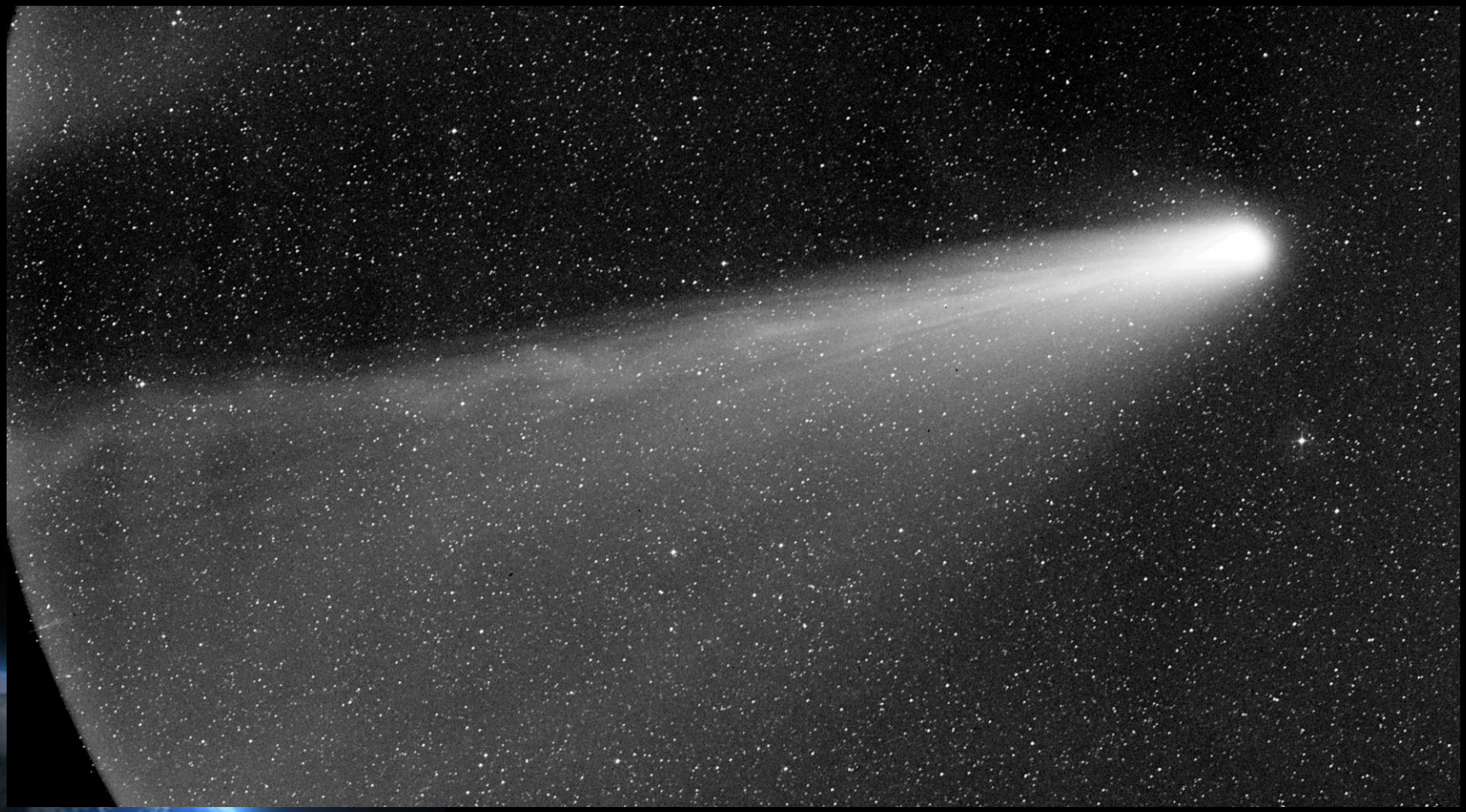
Galactic:

- open clusters
- flare stars
- H alpha objects
- spectral classification

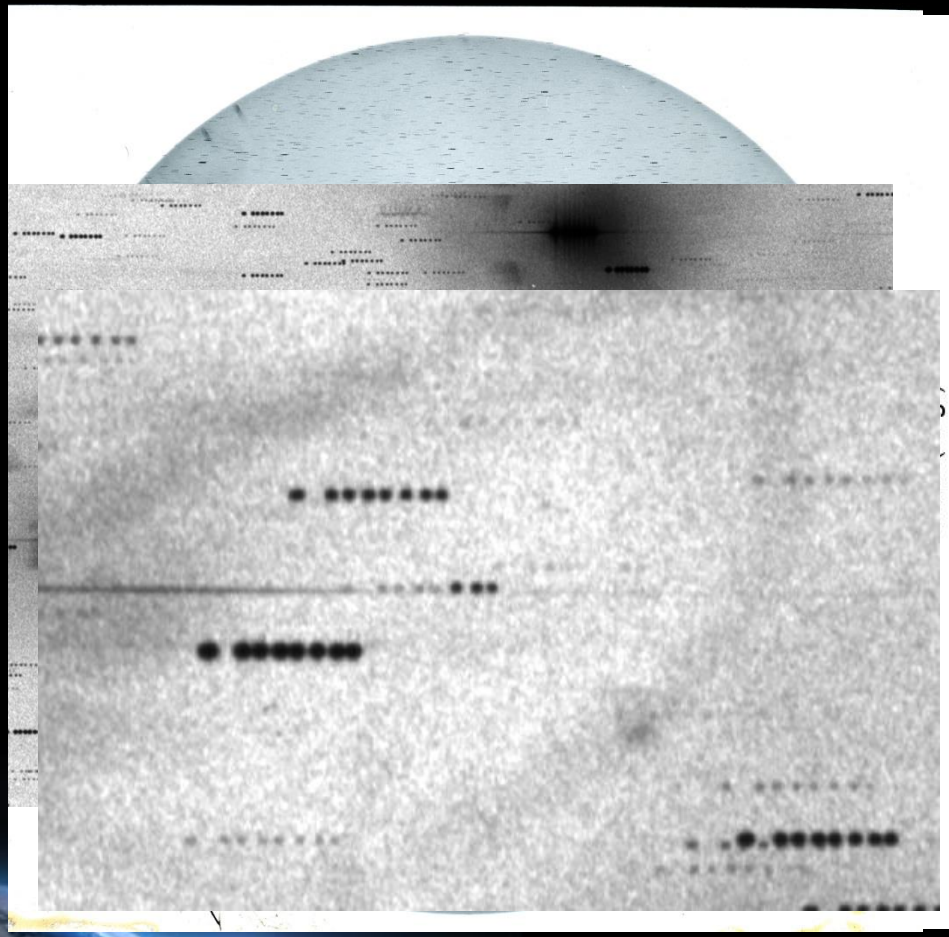
Extragalactic:

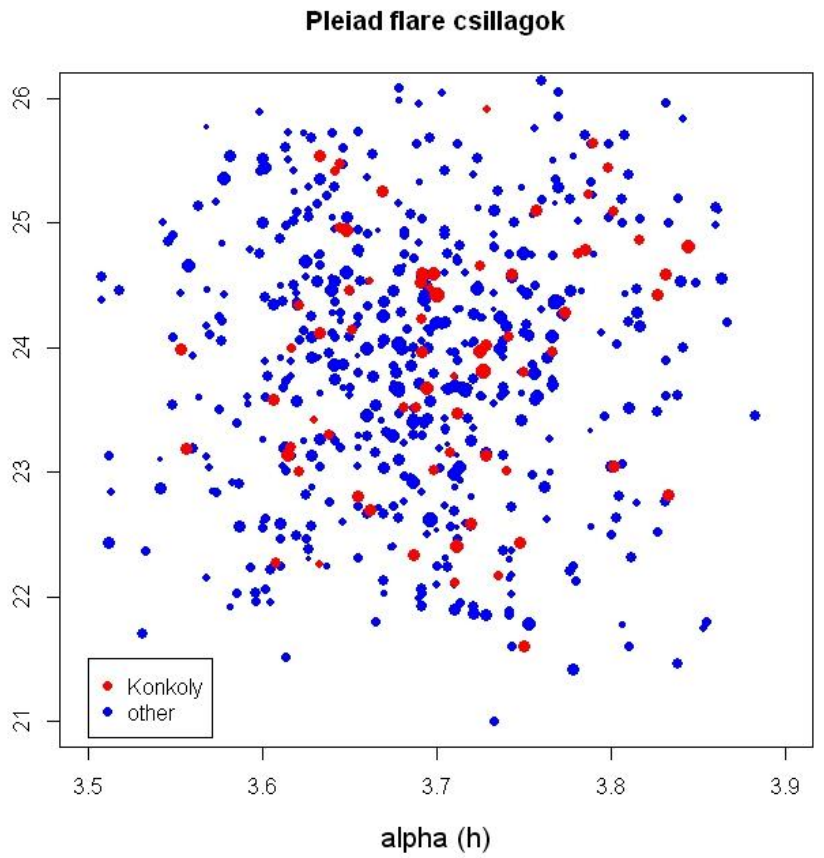
- supernova search

Comet West (1975n)



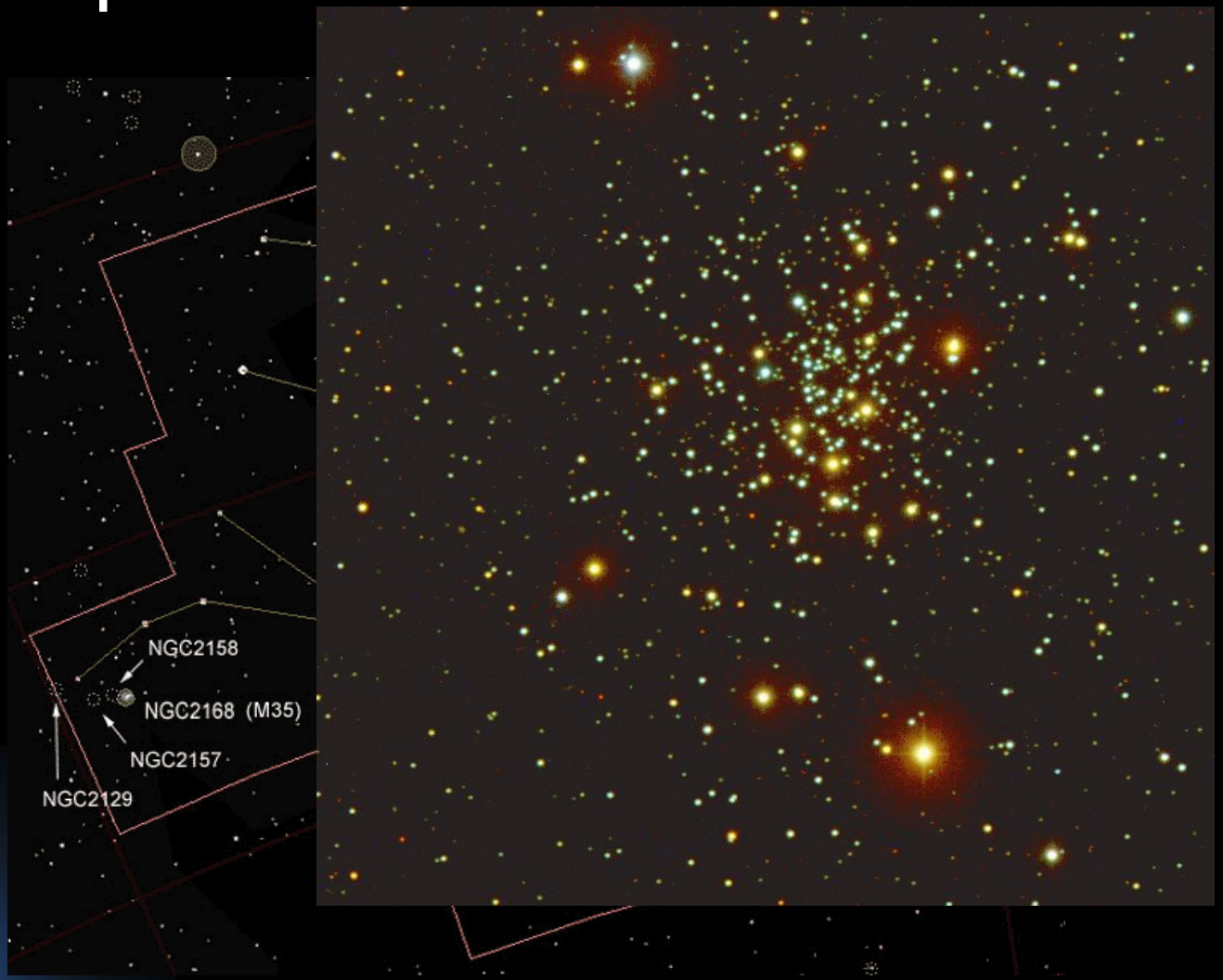
Flare stars in Pleiades
(first one: October 8,1970.)





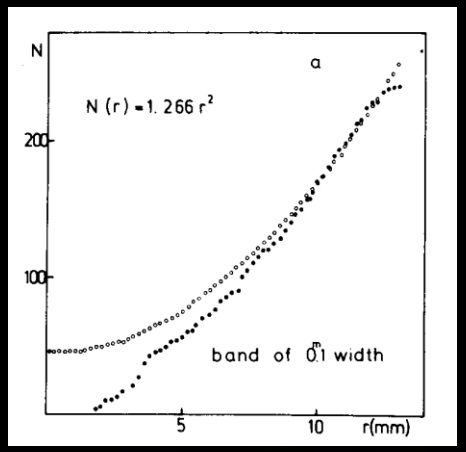
Cooperation with Byurakan, Armenia

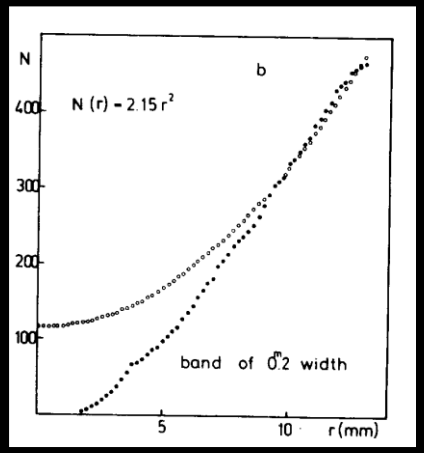
Open cluster NGC 2420

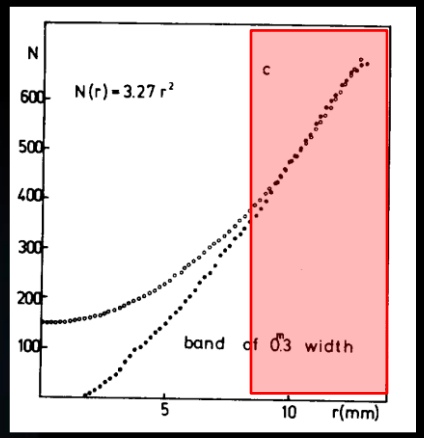


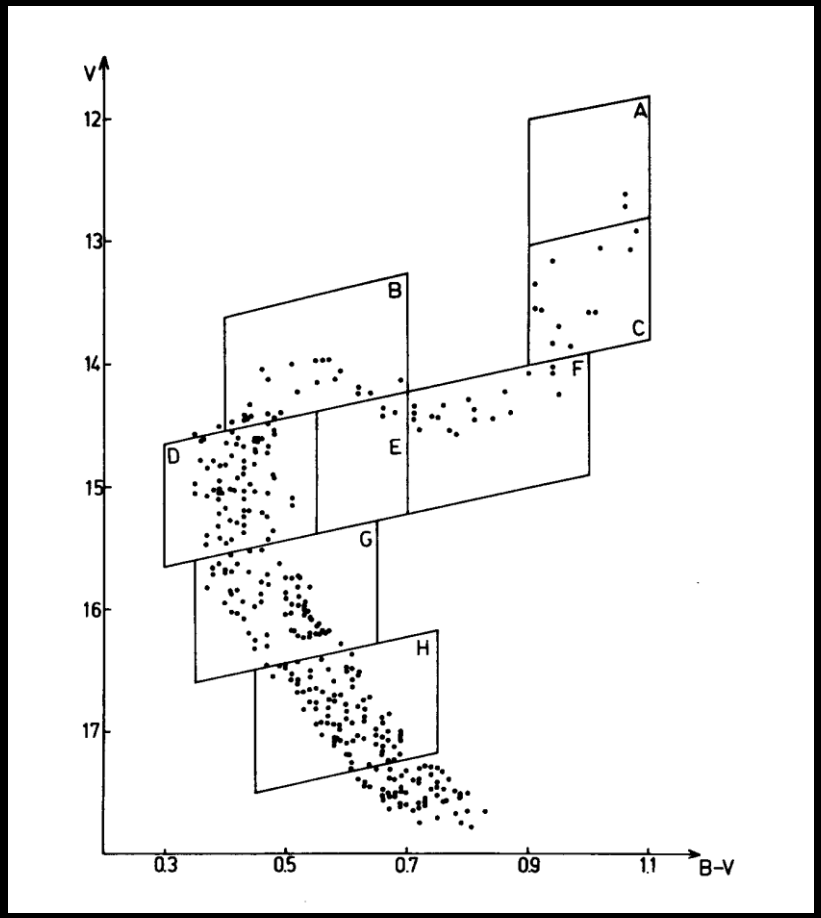
Open cluster NGC 2420

structure (size > tidal radius)





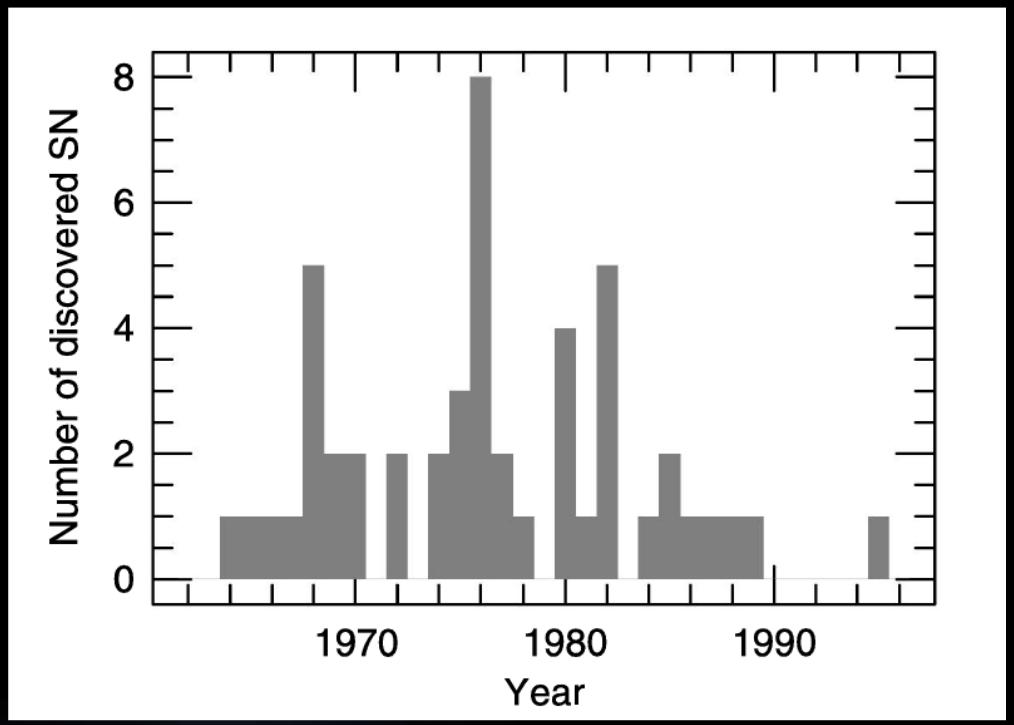




Paparo, M., 1982, Com. Kon. Obs., No. 81, p. 101-140

Photographically found SNs

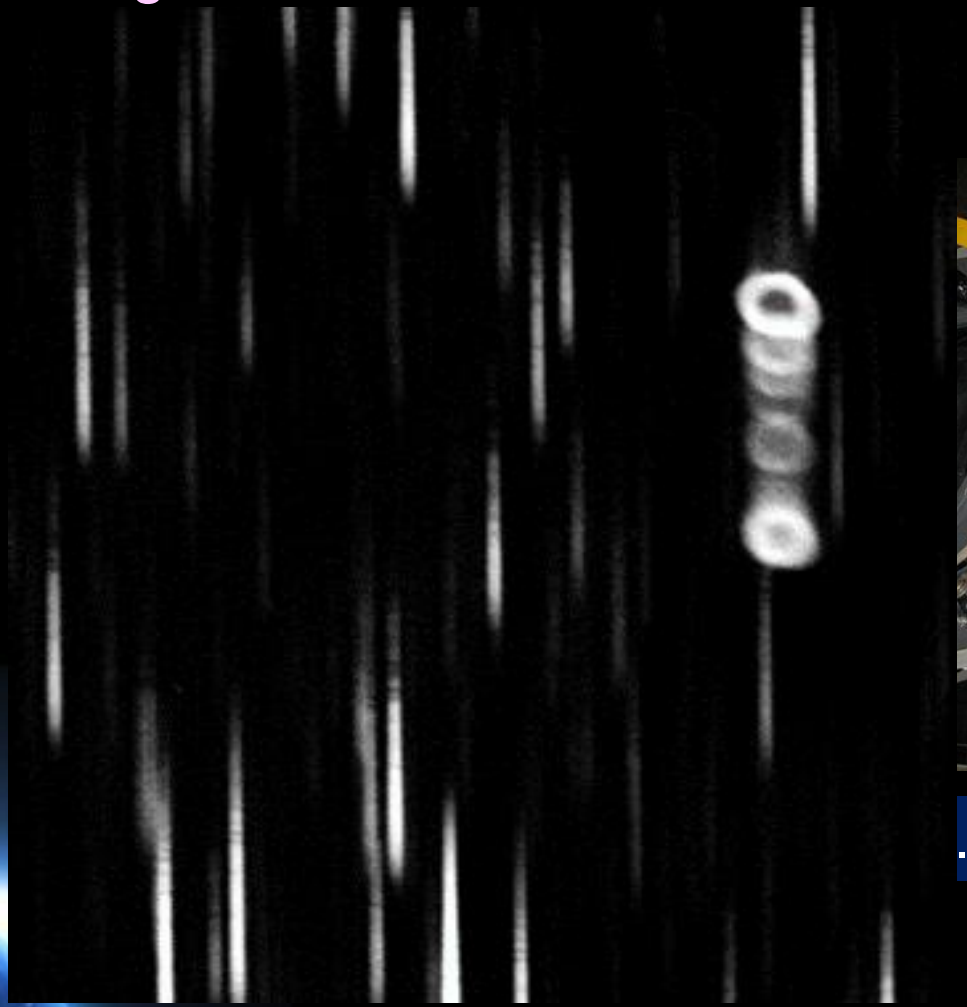
(total: 49)



Brightest SN found with Schmidt:
SN 1970G az M101-ben

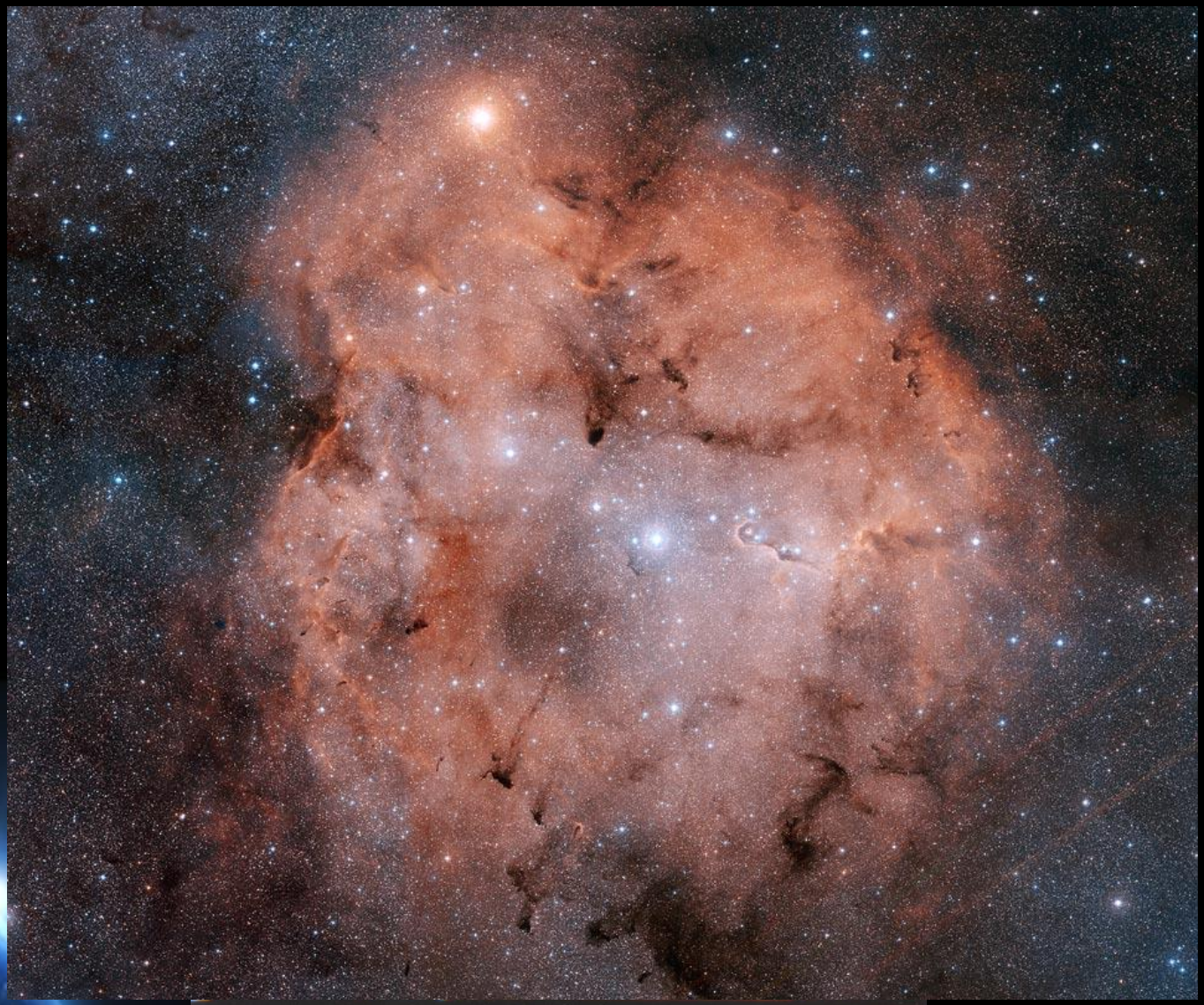
Objectiv prism

(BK7 glass: 5^o 580 A/mm, 2^o 1200 A/mm at Hγ)

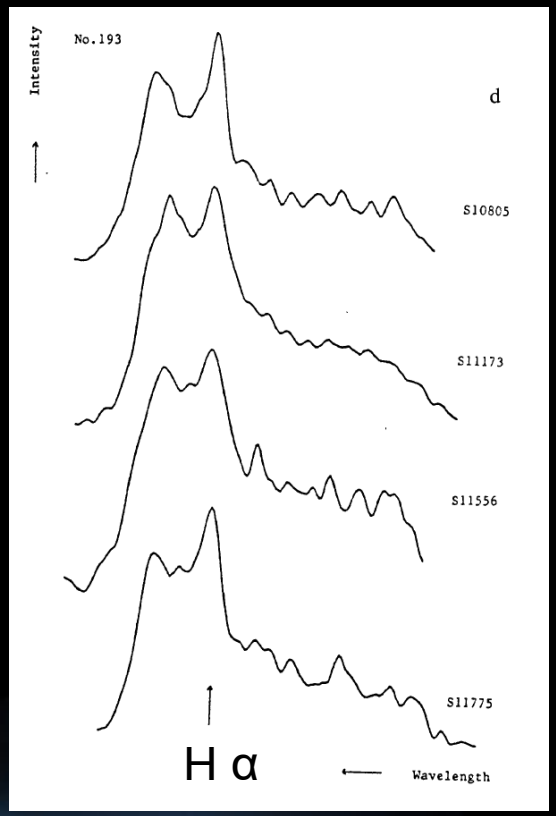


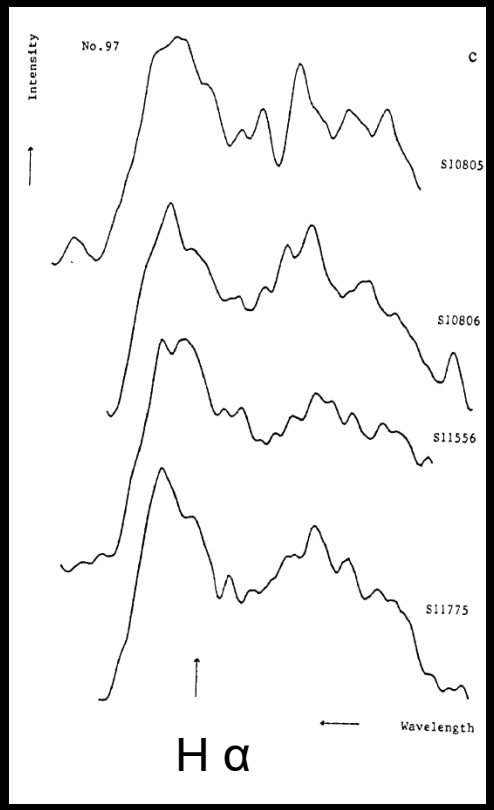
., Japan

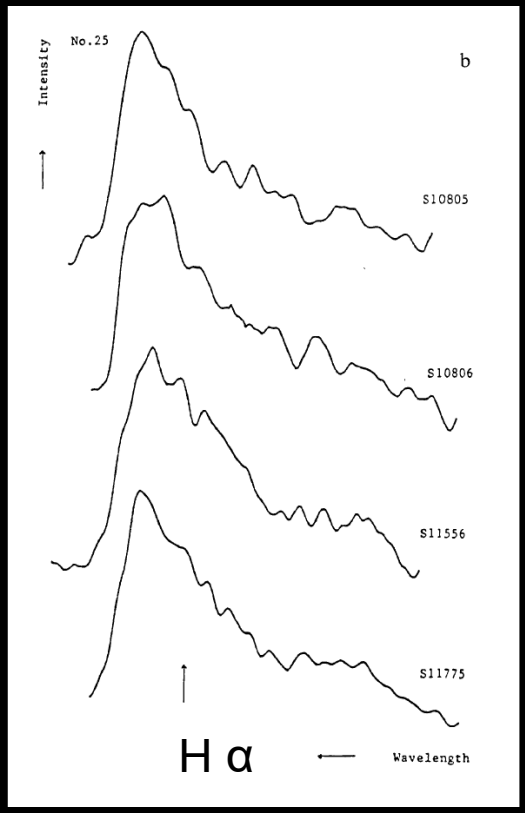
IC1395 HII region



IC1396: Hα stars







RG1 filter + 5^{o} prism

Re-unification

1982 : Increasing economical troubles
merging the institutes in Budapest and Debrecen -
Research Institute of Astronomy of HAS

1990 : changing the political system - cutting down-
1994 : Station of Baja - Astronomical Institute of Bács-Kiskun County
1997 : consolidation at HAS

1992 : first SUN workstation - local network
1993 : CCD for the 1 m telescope in Matra
1996: CCD on Schmidt telescope
1998 : local network in Matra and Budapest

Integration into research centre

2013: HAS decided to integrate the institutions into research cetres

Our institute was integrated into
Research Centre for Astronomy and Earth Sciences

Integrated institutions

- KTM Institut of Astronomy
- Geographical Institut
- Institute for Geological and Geochemical Research
- Institute of Geodesy and Geophysics

2021: Institute of Geodesy and Geophysics separated and formed a new instititute :
Institute of Earth and Space Siences

Closing remarks - vistas into the future

100 years history: Successful middle course between scientific challenges and financial possibilities

Our way into Europe : new challenges - what and how?
Important: looking for and realization of new resources
Time for new big investments (last one in 1974)

Characteristics of the institute: revival and new start - symbols of vitality and European values of Hungarian culture

Many success for you

in the next 150 years !!