

# Large and small telescopes in search of answers to the biggest questions

Marek Górski

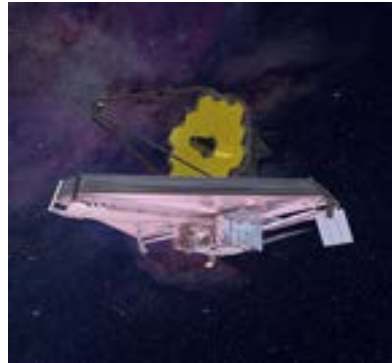
28–29 NOVEMBER, 2024 - SOPOT



# Biggest Questions in Astronomy & Next Generation Telescopes

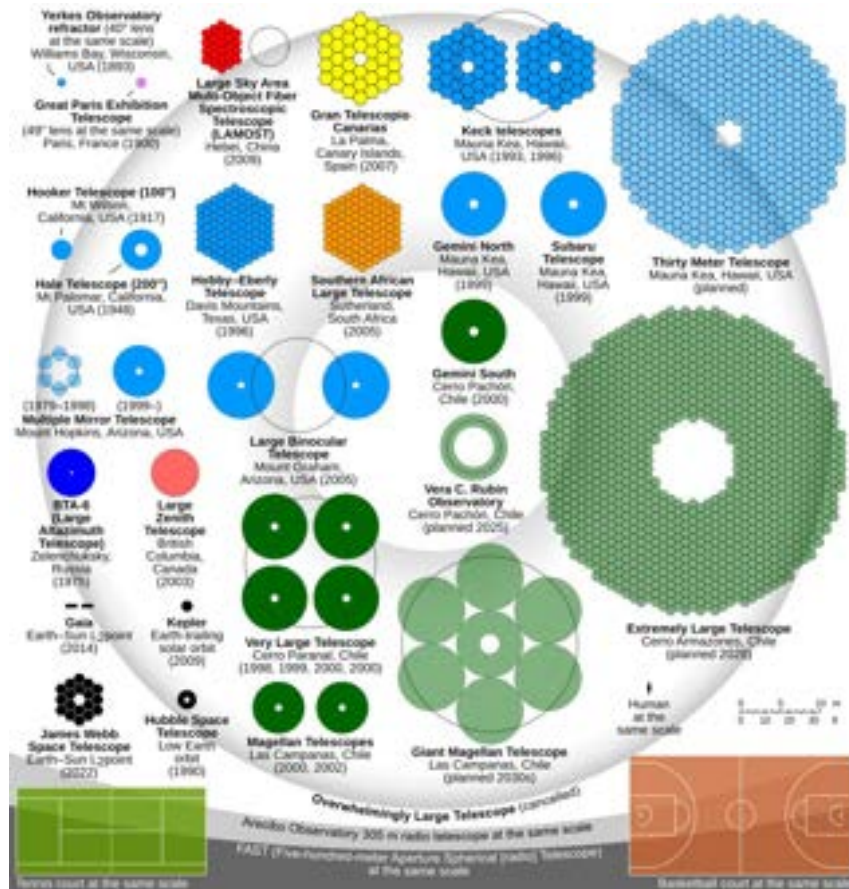
- Exoplanets
- Space safety, NEO
- First generation of stars
- First galaxies
- Dark matter
- Dark energy
- Structure of the universe
- Hubble tension

- **James Webb Space Telescope (JWST)**
- Nancy Grace Roman Space Telescope (W-FIRST)
- Vera C. Rubin Observatory (LSST)
- Giant Magellan Telescope (GMT)
- Cherenkov Telescope Array (CTA)
- Advanced Telescope for High Energy Astrophysics
- **Extremely Large Telescope (ELT)**



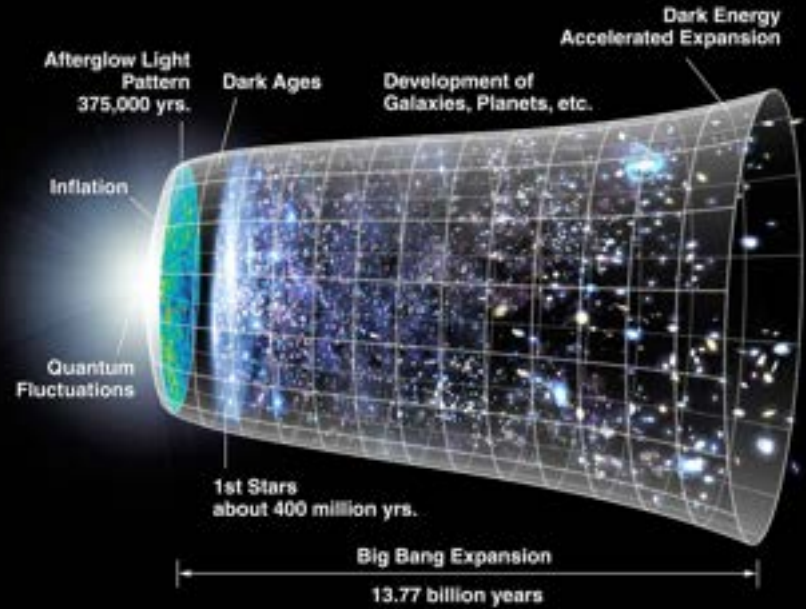
# Biggest Questions in Astronomy & Next Generation Telescopes

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**Hubble constant ( $H_0$ )** - one of the parameters of the cosmological model - rate universe expansion

- Universe size & age



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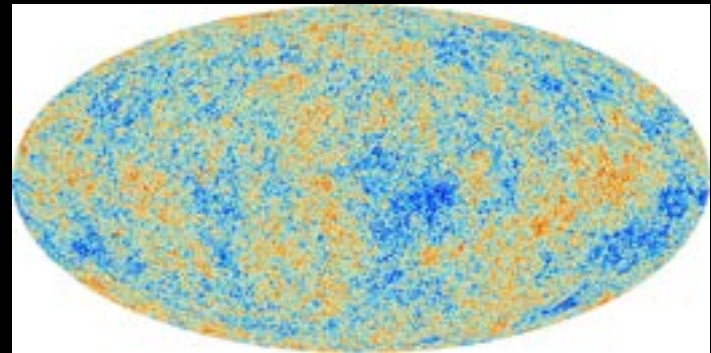
**Crisis in cosmology - new physics  
- caused by systematic errors?**

- CMB: **67.4** km/s/Mpc

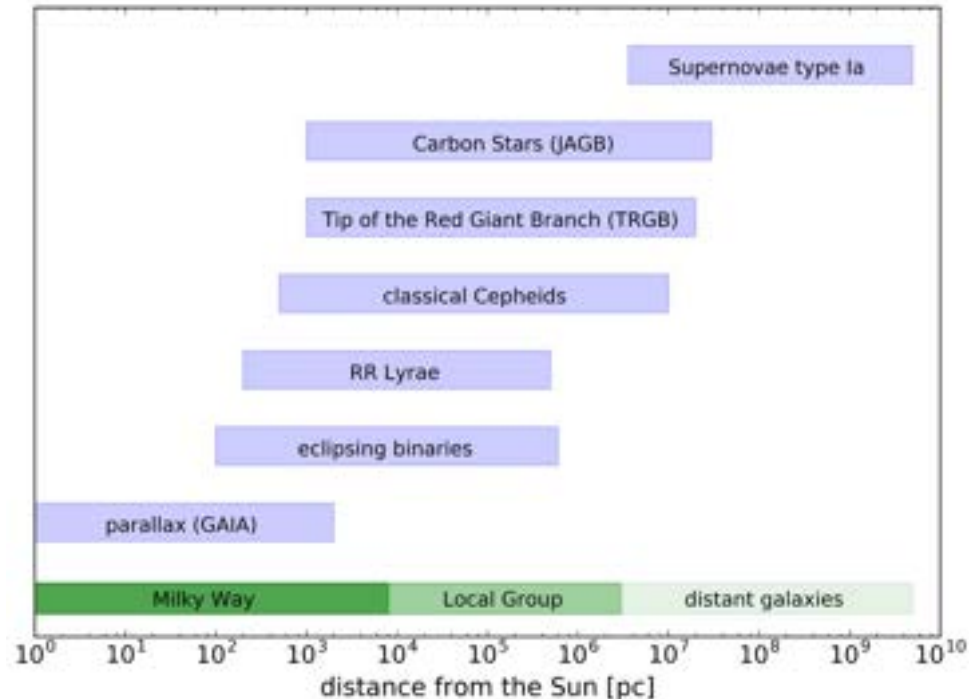
- Distance Ladder: **73.2** km/s/Mpc

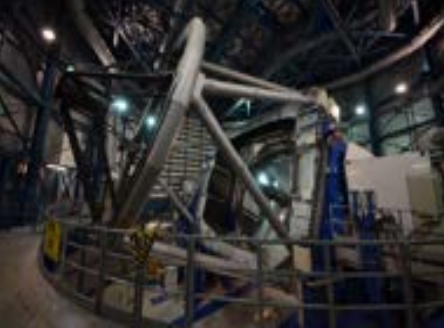
accuracy: **1%**.

discrepancies: **10%**



- compare results
  - different methods
  - different objects (galaxies)
- investigate systematic errors
  - physics behind distance estimators
- **measure Hubble constant with other (independent) technique**

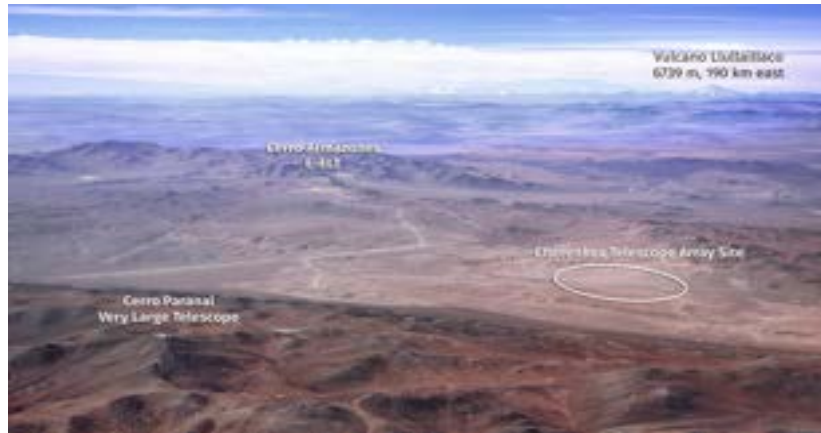




# Cerro Murphy Observatory: 2020

## [Prof. G. Pietrzyński](#)

- the **Polish Ministry of Science and Higher Education** grant DIR/WK/2018/09
- **European Research Council (ERC)** - SYNERGY grant agreement No. 951549 (UniverScale)



**RUB** offer of transferring **OCM** to **NCAC-PAN**  
agreement between ESO, NCAC, and RUB  
January 17, 2020

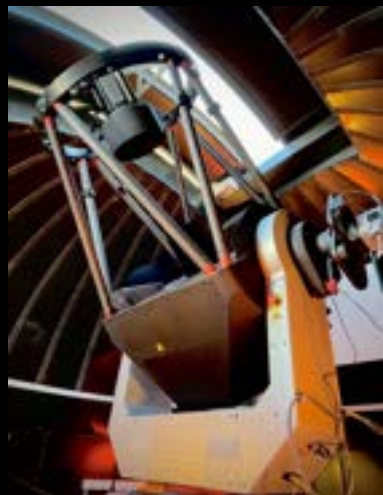
# Cerro Murphy Observatory - 2021/2023



- **Telescopes - astroysteme ASA**  
(Gambato, Senco, Andor + other)
- Solar panels & batteries
- electric & network modernization
- building modernization







# Cerro Murphy Observatory - current

**wk06**

Wojtek Krzemiński telescope

60 cm equatorial mount

2k x 2k Andor iKon-L 936

**Strömgren** (u b v y), H $\beta$  wide, H $\beta$  narrow, **Johnson-Cousins** (B V I)



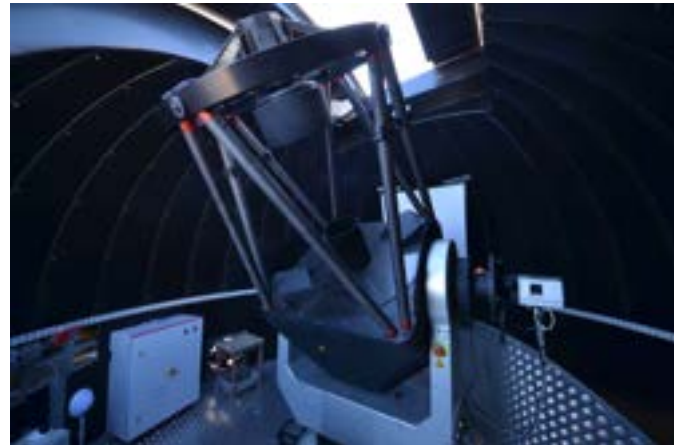
**zb08**

Zbigniew Kołaczkowski telescope

80 cm alt-az mount

2k x 2k Andor iKon-L 936

**Sloan** filters (u g r i z) &  
**Johnson-Cousins** filters (B V I)



# Cerro Armazones Observatory - current

## IRIS

InfraRed Imaging System  
0.8m 1k x 1k NIR CCD

## jk15

Jan Kalužny telescope

1.5m alt-az mount

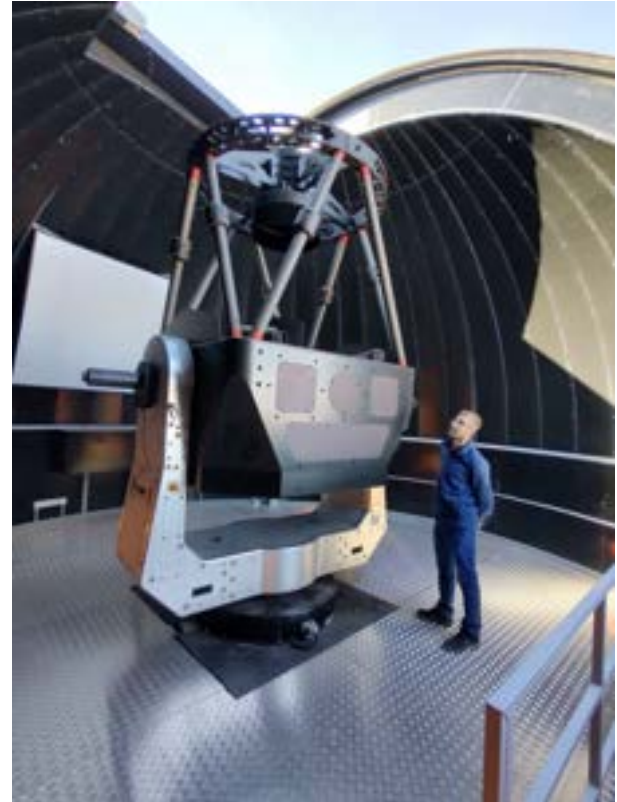
4k x 4k Andor iKon-XL 230

Strömgren (u b v y), H $\alpha$  wide, H $\alpha$  narrow,  
H $\beta$  wide, H $\beta$  narrow, Sloan (u g r i z), and  
Johnson-Cousins (B V I)

## wg25

Wolfgang Gieren telescope

2.5m alt-az mount









THANK YOU FOR ATTENTION!

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