“SMALL” TELESCOPES

L. Tomasella, G.M. Stirpe, G. Leto, M. Dolci

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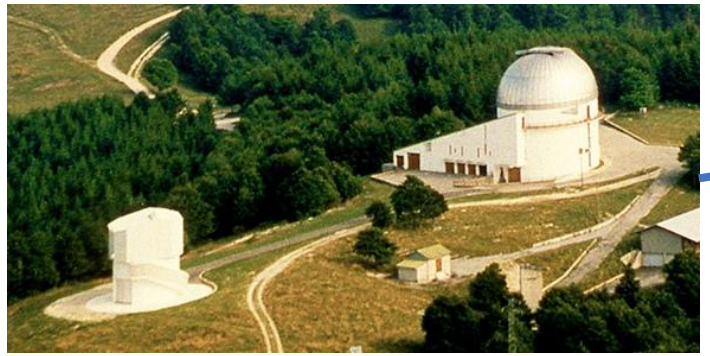
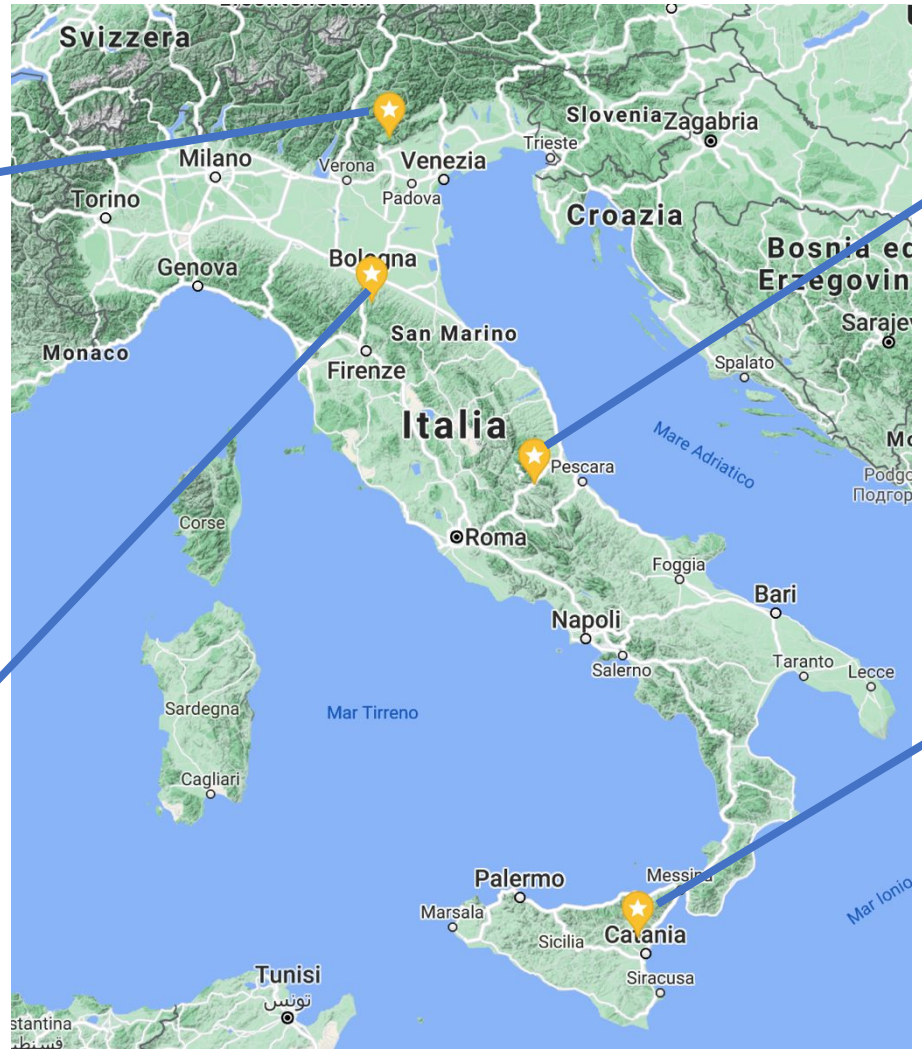
INAF Infrastructures Auditions – 31/5/2021



Asiago/Cima Ekar – 1400m asl
INAF – OA Padova

Loiano – 800m asl
INAF – OAS Bologna



Campo Imperatore – 2200m asl
INAF – OA Abruzzo

Serra la Nave – 1700m asl
INAF – OA Catania

Asiago-Ekar - INAF Padova

telescopes and instrumentation

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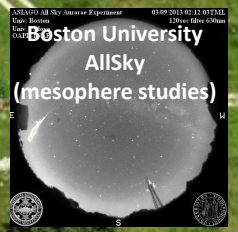

Copernico 1.82m:
photometry, polarimetry and spectroscopy with Afosc (uBVgriz-bands, narrowband filters; large set of grisms R=200/5000; polarimeter; FOV~8X8'); high-res spectroscopy with Echelle (R~20000); hosting proprietary instruments (i.e. Aqueye+) and a permanent AO laboratory as part of ADONI (ADaptive Optics National laboratory). **Operated remotely.**

Schmidt 67/92:
CCD camera for multiband photometry (uBVgriz), FOV~1X1 deg. **Used in robotic mode.**

Both are used every clear night for:

1. Science and technology [~80%]
2. Education (PhD schools, i.e. NEON; university students; high-schools students) [~20%]
3. Testing and outreach [few nights/year]

Asiago-Ekar - INAF Padova

team and telescopes organization

Team:
L.Tomasella, S.Benetti (INAF PD) - **management**

V.Chiomento*, A.Frigo*, L.Lessio, G.Martorana*, D.Selvestrel, L.Traverso* (INAF PD) - **technical staff**

E.Cappellaro, D.Fantinel, L.Zampieri, S.Chinellato, D.Greggio (INAF PD) - **instrumental HW&SW development**

C.Knapic, S.Zorba, M.Vicinanza (INAF TS) - **IA2 Archive**

V.Nascimbeni (INAF Pd), G.Iafrate (INAF TS), G.Piotto, A.Pizzella (Uni PD), T.Zwitter (Uni Ljubljana) - **High Education**

P.Ochner (Uni PD) - **Service & outreach**

*FULL TIME (FTE=1)

Call for proposals: every 2 years for Large Programs; observers can apply at any moment for Small Programs (few hours, executed in service mode):

1. Telescope time is awarded to a small number of projects (actually ~15 PIs) >> efficient use of the telescopes
2. Co-Is (a few dozen) from different institutes; projects are usually part of big collaborations: i.e. GRAWITA, ePessto, NUTS, Engrave … >> national and international cooperation/availability
3. Easy ToO execution or re-scheduling; remote (for 1.82m) or robotic (for Schmidt) control; INAF IA2 Archive >> maximum flexibility
4. No night technical assistance (only emergency call) >> skilled observers are required
5. University Education: Laurea, laboratories, PhD, international observing schools (i.e. OPTICON NEON) … >> high educational value!
6. Hosting private instruments (Aqueye, CNR photocounter; space debris camera …); permanently the AO lab. as part of ADaptive Optics National laboratory (ADONI) >> technological tests

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Large Programmes 2020-2021 (next Call: Dec 2021)

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Copernico 1.82m (Remote control)

- TASTE the Asiago search for transit timing variations of exoplanets (**joint coll. Harps-N@TNG**)
- Spectroscopy of primordial asteroids (Paris Meudon coll.)
- ILOTs and impostors
- SNe classification and follow-up
- follow-up of gravitational waves, GRB, neutrini triggers (GRAWITA coll.)
- AGN reverberation mapping in polarized light
- Observation of Quasars (reverberation mapping)
- The long standing monitoring of symbiotic stars and novae (with Echelle).
- Spectroscopic Binary stars (with Echelle)
- Follow-up of active and binary stars (with Echelle, joint coll. RAVE, GALAH, Gaia, Uni Ljiubljana).
- Aqueye (proprietary instrument; Asiago Quantum Eye, ultrafast photon counter, Zampieri INAF, Naletto UniPd).

Schmidt 67/92 (Robotic)

- Survey on binaries, exoplanets, variables in open clusters (Asiago pathfinder for HARPS-N)
- SNe photometric follow-up
- ILOTs photometric follow-up
- GRAWITA gravitational waves and neutrino follow-up
- Monitoring of sub-giants stars
- follow-up of star clusters observed by TESS (transits of exoplanets)
- Novae and Galactic transients
- FRB: photometric monitoring

No stop during pandemic time ….

Asiago-Ekar - INAF PADOVA

scientific production

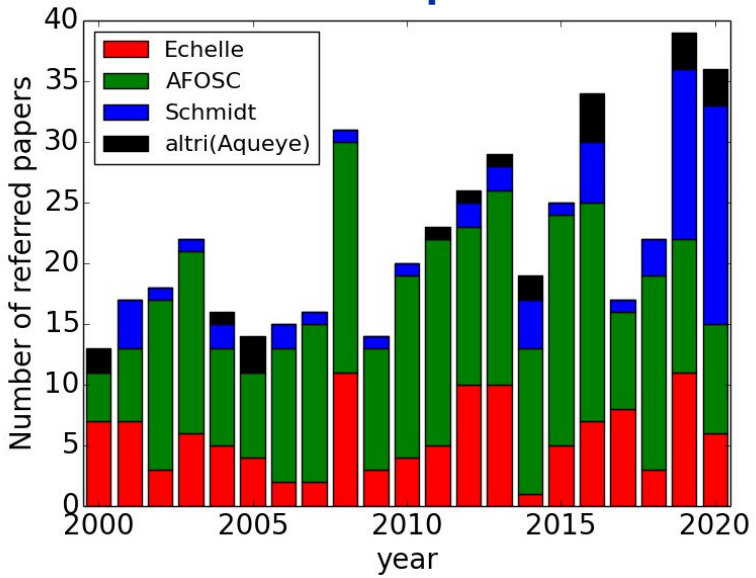
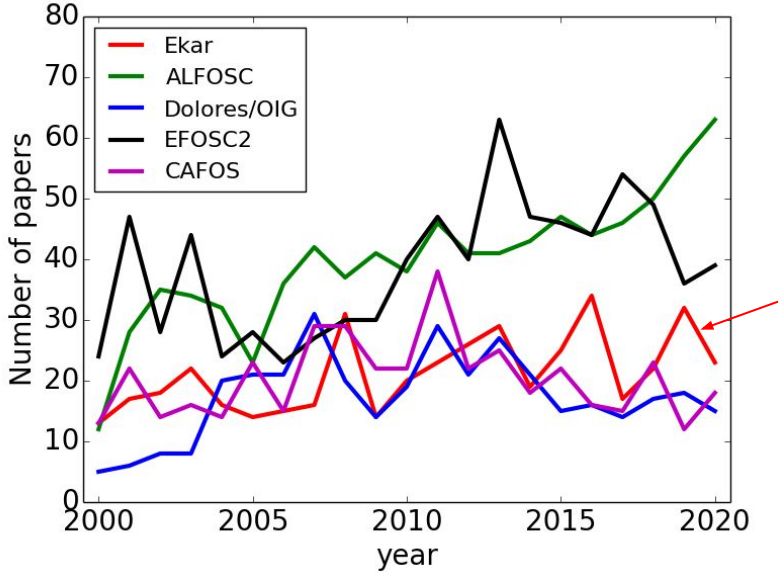


fig.1: refereed papers per instrument @Ekar



@Ekar about 50 ref. papers in the last 2 years (2019-2020)

fig.2: comparison with other telescopes

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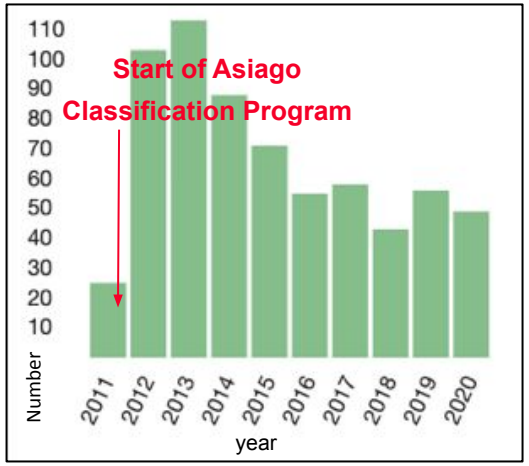


fig.3: Atels, GCN, AstroNote …

Few selected highlights:


nature

Explore content · Journal information · Publish with us

nature › letters › article

Published: 12 October 2017

The size, shape, density and ring of the dwarf planet Haumea from a stellar occultation

J. L. Ortiz, P. Santos-Sanz, [...]R. Iglesias-Marzoa

Nature **550**, 219–223 (2017) | Cite this article

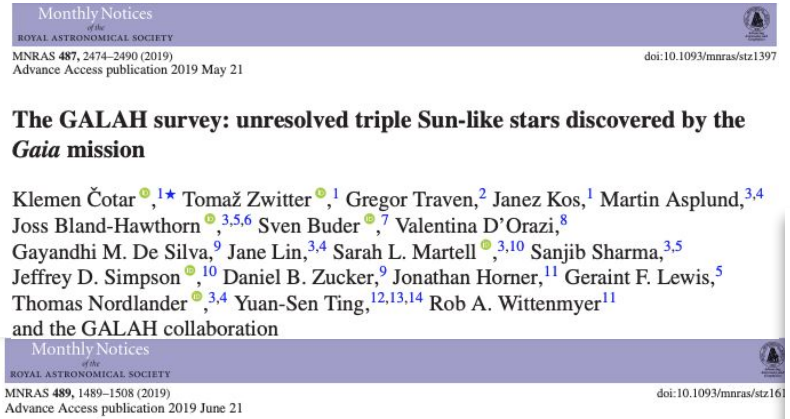
1587 Accesses | 86 Citations | 773 Altmetric | Metrics

LETTER

LETTER RESEARCH

Slowly fading super-luminous supernovae that are not pair-instability explosions

M. Nicholl[1], S. J. Smartt[1], A. Jerkstrand[1], C. Inserra[1], M. McCrum[1], R. Kotak[1], M. Fraser[1], D. Wright[1], T.-W. Chen[1], K. Smith[1], D. R. Young[1], S. A. Sim[1], S. Valenti[2,3], D. A. Howell[2,3], F. Bresolin[4], R. P. Kudritzki[4], J. L. Tonry[4], M. E. Huber[4], A. Rest[5], A. Pastorello[6], L. Tomasella[6], E. Cappellaro[6], S. Benetti[6], S. Mattila[7,8], E. Kankare[7,8], T. Kangas[8], G. Leloudas[9,10], J. Sollerman[11],


Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY

MNRAS **487**, 2474–2490 (2019) doi:10.1093/mnras/stz1397

Advance Access publication 2019 May 21

The GALAH survey: unresolved triple Sun-like stars discovered by the *Gaia* mission

Klemen Čotar[1]★ Tomaž Zwitter[1] Gregor Traven,[2] Janez Kos,[1] Martin Asplund,[3,4] Joss Bland-Hawthorn[3,5,6] Sven Buder[7] Valentina D'Orazi,[8] Gayandhi M. De Silva,[9] Jane Lin,[3,4] Sarah L. Martell[3,10] Sanjib Sharma,[3,5] Jeffrey D. Simpson[10] Daniel B. Zucker,[9] Jonathan Horner,[11] Geraint F. Lewis,[5] Thomas Nordlander[3,4] Yuan-Sen Ting,[12,13,14] Rob A. Wittenmyer[11] and the GALAH collaboration

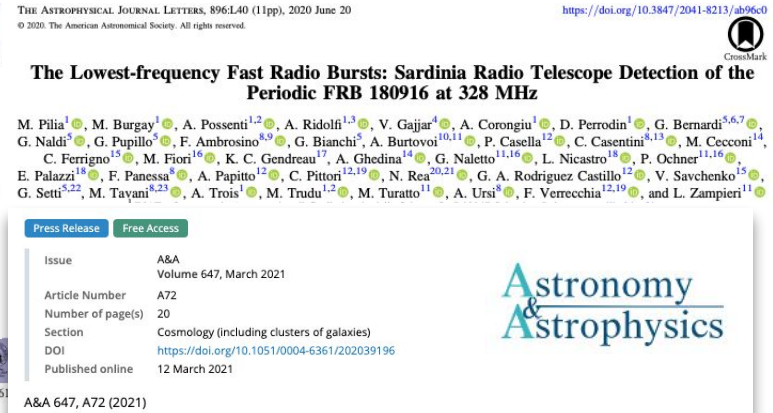
Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY

MNRAS **489**, 1489–1508 (2019) doi:10.1093/mnras/stz161

Advance Access publication 2019 June 21

Partly burnt runaway stellar remnants from peculiar thermonuclear supernovae

R. Raddi[1]★ M. A. Hollands,[2] D. Koester,[3] J. J. Hermes,[4,5] B. T. Gänsicke,[2] U. Heber,[1] K. J. Shen,[6] D. M. Townsley,[7] A. F. Pala[2,8] J. S. Reding,[5] O. F. Toloza,[2] I. Pelisoli[9] S. Geier,[9] N. P. Gentile Fusillo,[2] U. Munari[10] and J. Strader[11]


The Astrophysical Journal Letters, 896:L40 (11pp), 2020 June 20 https://doi.org/10.3847/2041-8213/ab96c0

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The Lowest-frequency Fast Radio Bursts: Sardinia Radio Telescope Detection of the Periodic FRB 180916 at 328 MHz

M. Pilia[1], M. Burgay[1], A. Possenti[1,2], A. Ridolfi[1,3], V. Gajjar[4], A. Corongiu[1], D. Perrodin[1], G. Bernardi[5,6,7], G. Naldi[5], G. Pupillo[5], F. Ambrosino[8,9], G. Bianchi[5], A. Burtovoi[10,11], P. Casella[12], C. Casentini[8,13], M. Cecconi[14], C. Ferrigno[15], M. Fiori[16], K. C. Gendreau[17], A. Ghedina[14], G. Naletto[11,16], L. Nicastro[18], P. Ochner[11,16], E. Palazzi[18], F. Panessa[8], A. Papitto[12], C. Pittori[12,19], N. Rea[20,21], G. A. Rodriguez Castillo[12], V. Savchenko[15], G. Setti[5,22], M. Tavani[8,23], A. Trois[1], M. Trudu[1,2], M. Turatto[11], A. Ursi[8], F. Verrecchia[12,19], and L. Zampieri[11]

Press Release Free Access

Issue	A&A Volume 647, March 2021
Article Number	A72
Number of page(s)	20
Section	Cosmology (including clusters of galaxies)
DOI	https://doi.org/10.1051/0004-6361/202039196
Published online	12 March 2021

Astronomy & Astrophysics

A&A 647, A72 (2021)

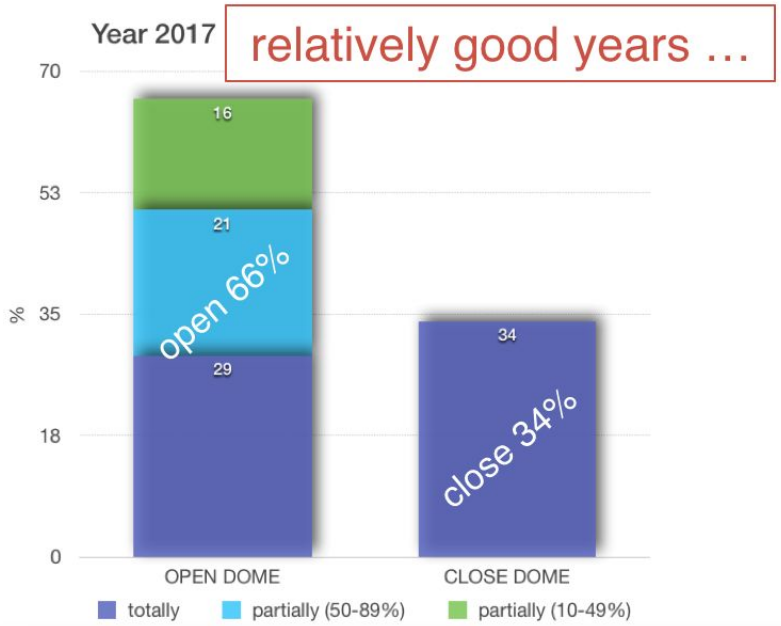
A new measurement of the Hubble constant using Type Ia supernovae calibrated with surface brightness fluctuations

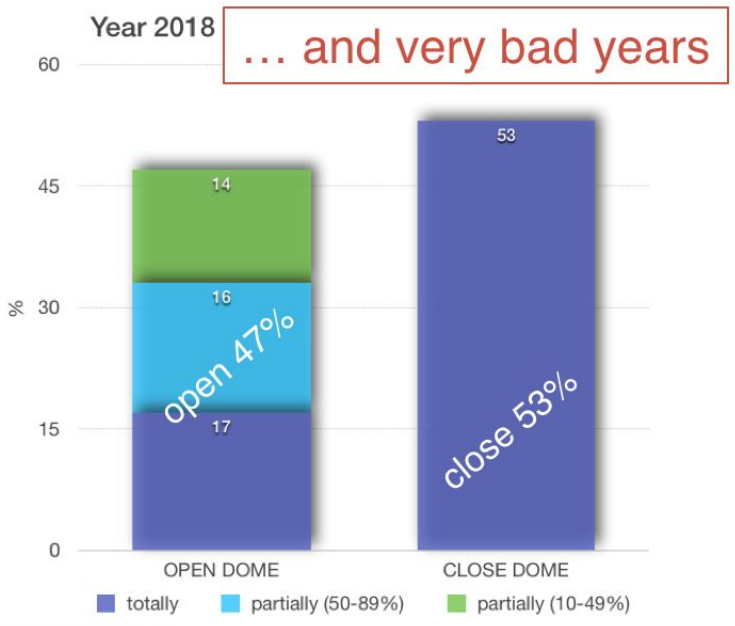
Nandita Khetan[1,2], Luca Izzo[3], Marica Branchesi[1,2,4], Radosław Wojtak[3], Michele Cantiello[4], Chandrashekar Murugeshan[5], Adriano Agnello[3], Enrico Cappellaro[6], Massimo Della Valle[7], Christa Gall[3], Jens Hjorth[3], Stefano Benetti[6], Enzo Brocato[4,8], Jamison Burke[9,10], Daichi Hiramatsu[9,10], D. Andrew Howell[9,10], Lina Tomasella[6] and Stefano Valenti[11]

Asiago-Ekar - INAF Padova

environmental conditions

Alpine climate, with snow in Winter and high humidity in Spring





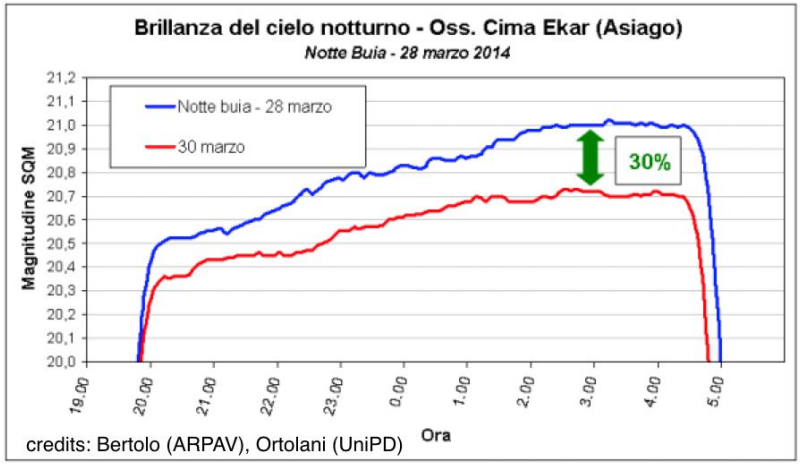
Telescopes are used ~50-65% (totally or partially) of the scheduled nights (~270 for 1.82m; ~360 for Schmidt). Copernico is in maintenance and testing in Spring time (~80 nights).

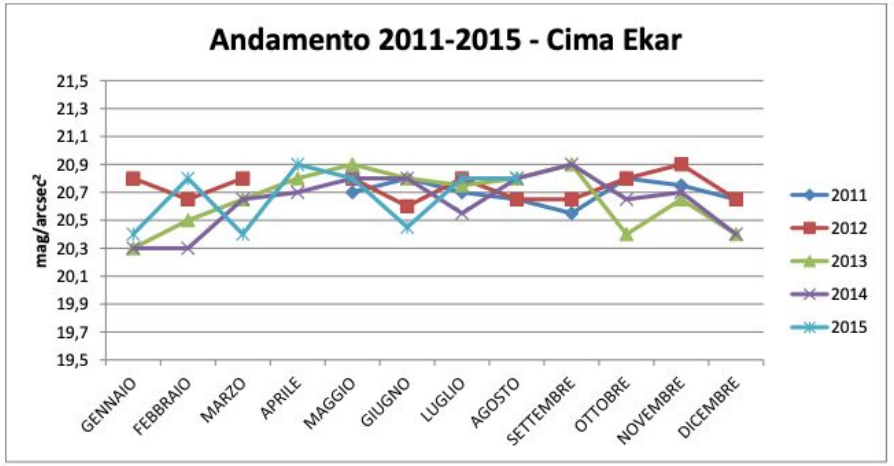
Robotic@Schmidt has highly improved efficiency (i.e. open dome statistics).

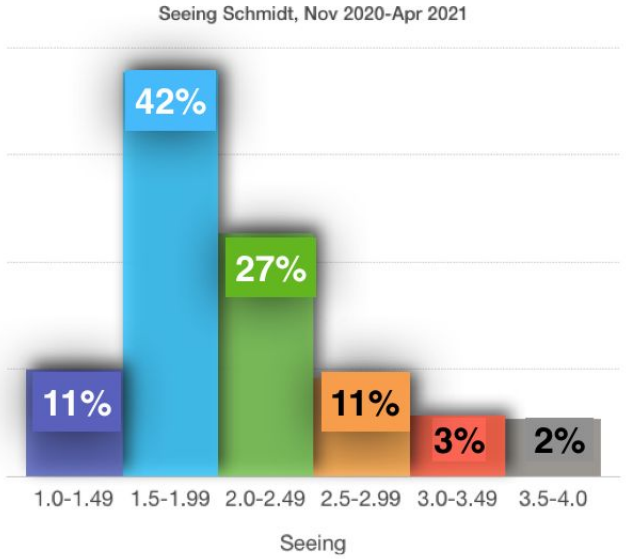
The night-sky brightness is monitored (by S. Ortolani) from decades. It is around 20.7-21 mag.

About 53% of the images have seeing better than 2".

Mount Ekar sky brightness







Asiago-Ekar - INAF Padova

critical issues

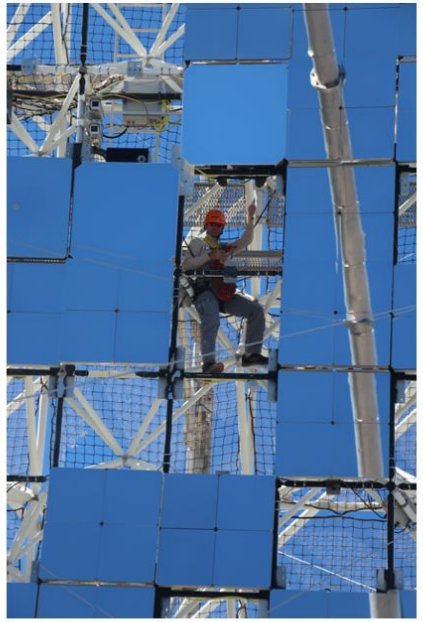
Main funds:

- FFO Asiago-Ekar ~ 72 k€ per year (personnel costs NOT included)
  >> OK for the day-to-day management
- a few thousands € from INAF PD research fund (~20-30 k€ per year)
  >> i.e. last year to finalise Schmidt robotization
- “fortuitous” external funds (i.e. Afosc CCD bought with Uni. Ljubljana funds in 2014)
  >> instruments and detectors get old … **which funds for future extraordinary management ?**

Ekar staff@ASTRI

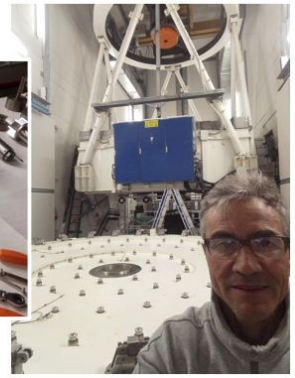
ASTRI mirrors@Ekar

CTA coating@Ekar



Ekar staff@Magic2

coating@Ekar



Ekar staff@TNG

Lack of technical team turn-over !!!

At present 4 technicians; 2 of them are very close to retirement. High professional skills (not easy to pass on without a period of coexistence at work).

Asiago technical staff is involved in several projects’ development/maintenance (**ASTRI & CTA, Magic, TNG, Aqueye, ADONI, mirrors coating for other observatories …**)

LOIANO (INAF – OAS Bologna)

- 1.52m “Cassini” telescope (1976) – used for science and SST (+ teaching)
  - Ritchey-Chrétien optics, 70’ FOV
  - Currently using BFOSC, 13’ FOV
- 60cm Zeiss telescope (1936) – used for outreach
- PRISMA camera
- Other outreach facilities (Planetarium, Interactive exhibit hall, Solar system model)
- Guesthouse (1936), includes also offices exhibit hall, and plate archive

- Land (ca 19 hectares), buildings and telescopes owned by University of Bologna
- managed by Bologna Observatory since mid-1980’s
- land management returned to UniBo in 2015

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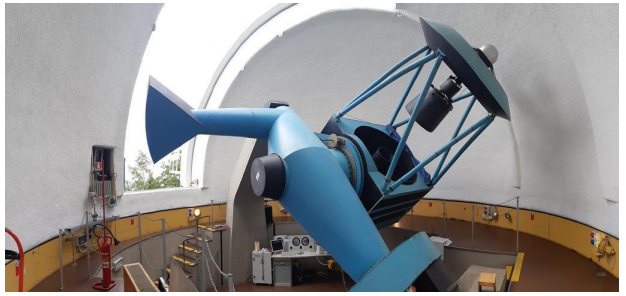


TEAM

LOIANO

Technicians:

- Ivan Bruni
- Antonio De Blasi
- Roberto Gualandi

Astronomers:

- Albino Carbognani – TD
- Silvia Galleti – AdR

BOLOGNA

- Giovanna M. Stirpe – associate astronomer – Coordinator
- Roberto Di Luca – technician - ICT services

+ support by Director, Administration and Prevention & Protection Service

BUDGET

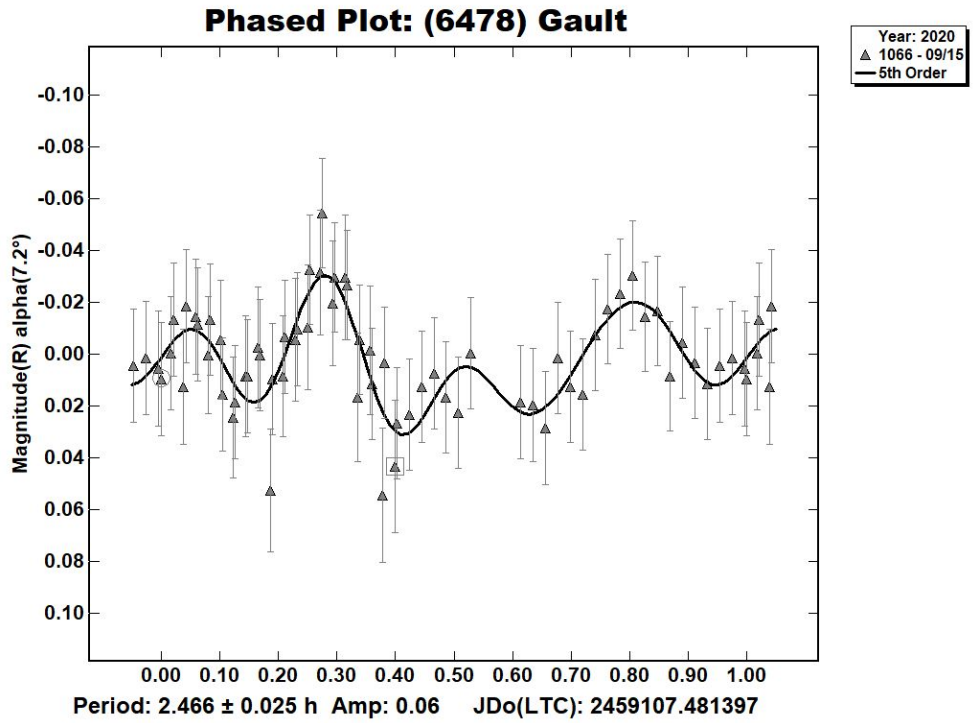
60 k€/year + salaries

SCIENTIFIC ACTIVITIES

- Scientific programmes by INAF – OAS and UniBo astronomers:
  - Long-period comets (Carbognani et al.)
  - Confirmation of weak NEOs in collaboration with MPC (Carbognani et al.)
  - Photometric characterization of active asteroids (e.g. Gault) (Carbognani et al.)
  - Exoplanet survey (Bruni et al.)
  - GAIA science alerts (Garofalo et al.)
  - Characterization of GW sources (GRAWITA)
  - Hard X-ray sources (Masetti et al.)
  - Variability of very high-z quasars (Decarli et al.)

- Scheduling every 6 months after internal call for proposals

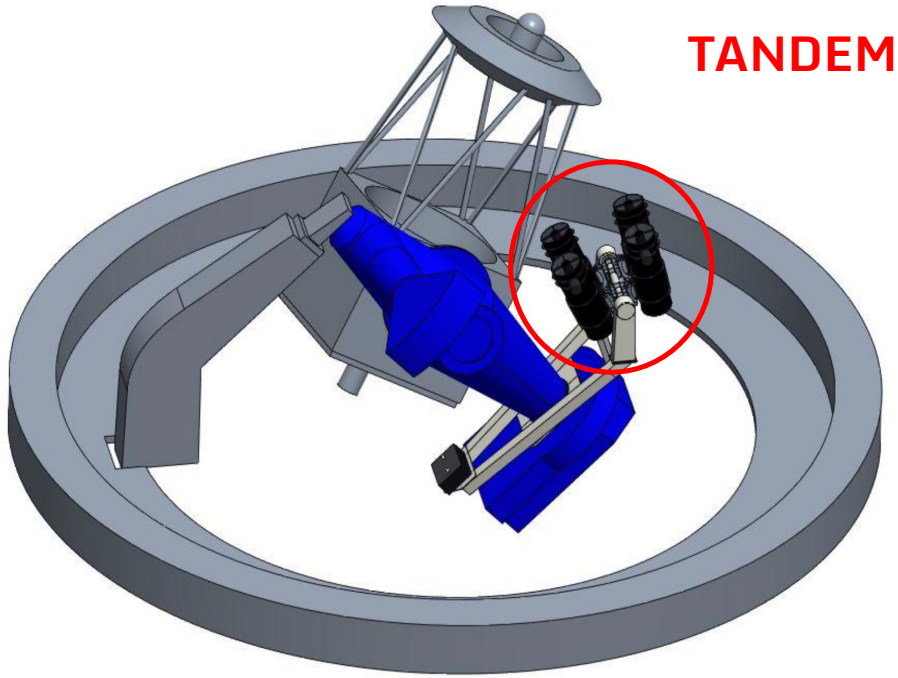
- About 10 papers/yr and more than 20 telegrams/circulars in last 3 years



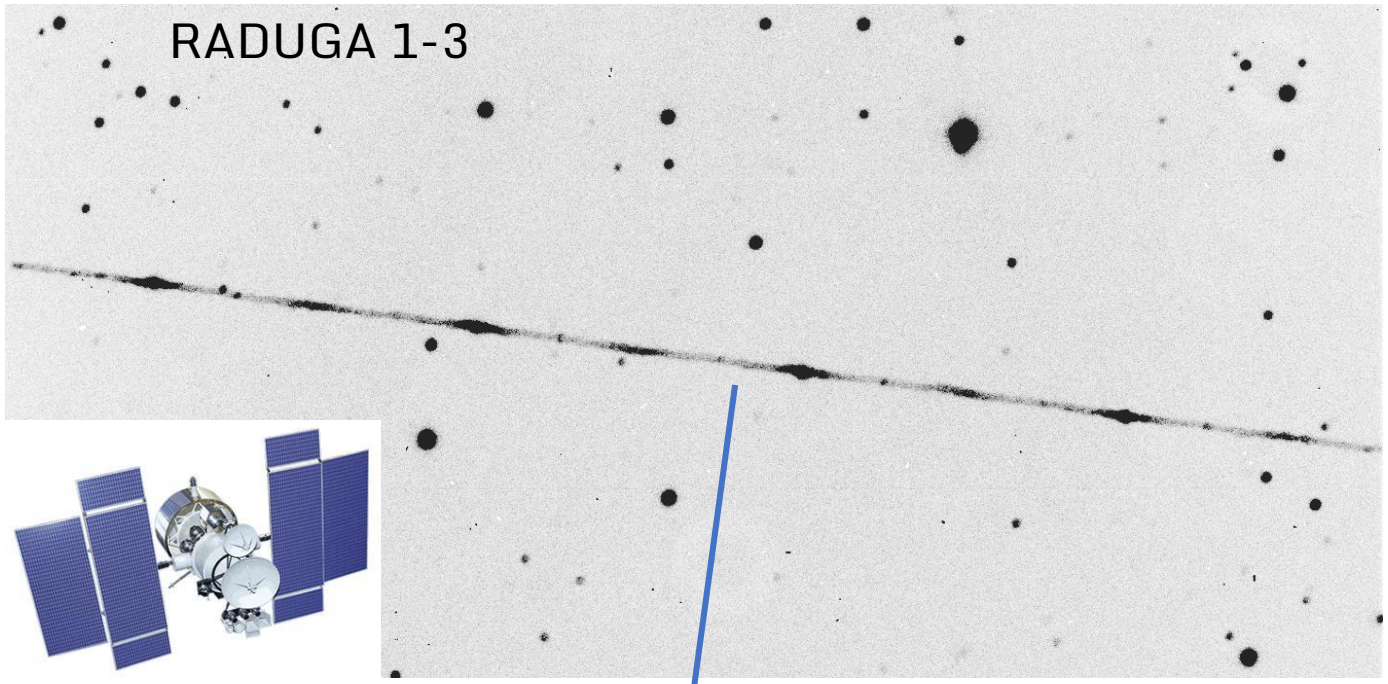
SPACE SURVEILLANCE AND TRACKING

PI: A. Buzzoni

- entered EUSST consortium and contributing to services since 2018, in MEO and GEO
- scheduling on weekly basis, based on tasking from ISOC
- Cassini can spot objects of a few cm in GEO, with accuracy of 8m
- planning new instruments:
  - TANDEM (about to be tendered), 4 x (2 x 2 deg^2) field, in flexible configuration - 350k€ EUSST
  - SuperFOSC (being designed at INAF - OAS) will allow us to recover wide FOV (1 x 1 deg^2)
- EUSST funds paying 1 TD contract and partially 1 AdR contract
- Loiano will host the control centre for ASTRA (All-Sky Tracking Array)



TANDEM



Sidereal tracking

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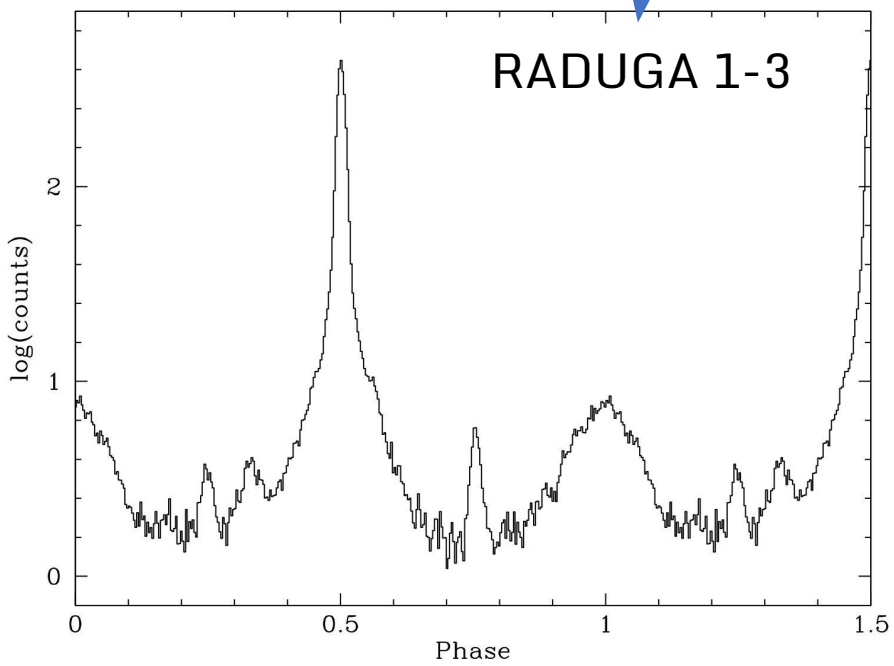
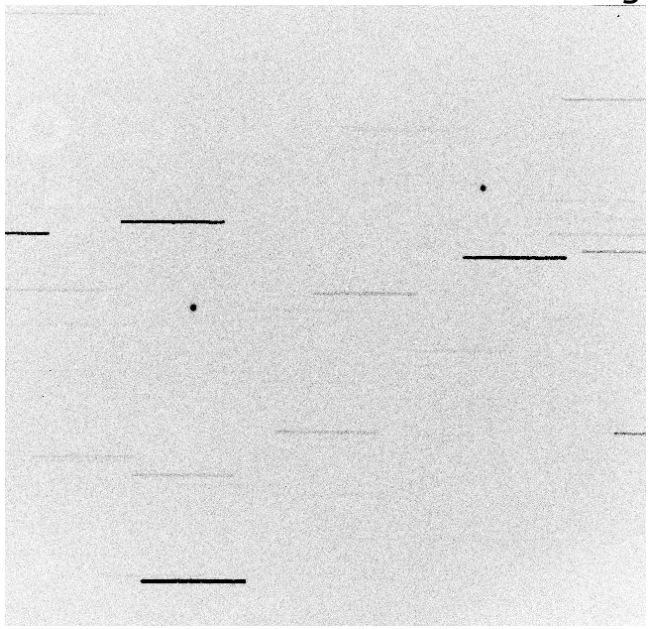
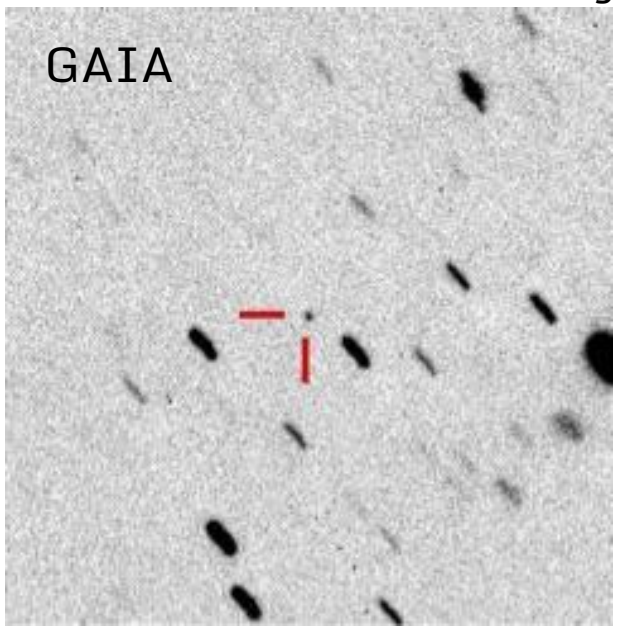


No tracking



Differential tracking



NIGHTS USED

	2018	2019	2020
Scheduled nights	150	167	262
Observed	86	101	152
Bad weather	64	66	64

CRITICAL POINTS

- Technical staff shortage
- No “tecnologo” following Loiano from 2018 until recently – development and updates lagging (working on that)
- Incomplete remote control and automation still requires too much human support for observations (working on that)
- Bureaucracy – spending money requires massive effort; current system can lead to poor results
- Older buildings requiring maintenance
- Asbestos removal from inside Cassini dome is being negotiated with UniBo

Presentazione Serra La Nave (Mt. Etna) – INAF-OACt

Altitude: 1725m s.l.m., Long: +14° 58'.4; Lat +37°41'.5

telescopes and instrumentation

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Outreach 40cm, f/8
Platform access for impaired people

Auxiliaries: All Sky, meteo station, Prisma

ASTRI-Horn

ASTRI-Horn Cherenkov
Dual-Mirror 4.3/1.8m , f/0.5 (f=2.2m)

Aperture $5m^2$ (18 segments)

FOV=10.5°, PSF 0.19°

M1: Al+SiO_2 / Dielectric coating

M2: Al+SiO_2

Camera ASTRI-Horn: SiPM Tiles, Topological Trigger inside PDM, PSF-80%/pix

Control Room, CED …

Outreach

Robotic APT2

Colacevich Cassegrain, 91cm, f/16 (14.3 m)

-Spectropolarimeter CAOS, Single object, Echelle, Fiber fed, Spect. Res.: 50000, Range 388 – 10000 nm

-Camera COLD, 1Kx1K, pix scale 0.66 arcsec/pix, FoV: 11.3x11.3 arcmin, Filters: UBVRI Hα

Colacevich

APT2 Ritchey-Chrétien, 80cm, f/8 Pointing speed: 0.75 deg/sec

Andor Aspen CCD camera (CG230-42), 2Kx2K, scale 0.47 arcsec/pix FoV: 16x16 arcmin.

Filters: UBVRI Hα & neutral

Foresteria

Conference room, studio, electro-mecc. workshops, Internet, rooms

Activities:

- Observations mainly international network collaborations
- University lab activities Master/PHD
- Outreach
- Ongoing Technology dev.:
  - Robotic tel., CCD COLD, CAOS
  - Cher. Telescope
  - Cher. Cameras: Horn, ASTRI-MA, Chec-s
  - ASTRI e Mini-Array Software: Control operation/archive/pipeline

SLN

Staff, Organization, Nights

Site manager Leto, G.

Resident Staff

Distefano (tech), Corsaro (guardian) , Scuderi C. (guardian)

Non Resident Staff (regular activity)

Bellassai, Bruno, Domina, Martinetti, Micciché, Occhipinti, Santagati

Non Resident Staff (when needed)

Buttaccio, Di Benedetto, Giuffrida, Grillo, Nicotra

Telescope/Instrument Scientist

Bonanno G., Catanzaro, Cutispoto, Frasca, Leto, Leone, Munari, Sanchez

ASTRI Staff (Other INAF Obs – remote support - at site when needed,)

Leto G. (Resp), Gianotti (CED), Gargano (Telescope), Mineo (Camera), Sironi (Optics)

+ 38 (regularly involved)

Outreach OACT Scientists

Maintainance: Telescopes/Instruments are maintained and upgraded when necessary under the responsibility of the Instrument scientists/group

Proposals: No regular call, no service mode (too few night assistants available), proposal are managed with the support of local scientists

Ongoing projects: CRAM, D&D@OACt, EXO-Arch, EXO-SPI, EXO-Stars, EXO-Young, HADES, HOT-ATMOS, GAPS2, MUCH, NERTIMP, nlmstars, PENELLOPE, PLUS, PRISMA, PROGRESS, STRADE, WEBT

SLN is a "laboratory" for Master and PHD in collaboration with UNICT

ASTRI-Horn: Till now operated as prototype verification/validation, test, and experiments.

From the fall will start as test site for:

- New mirrors test (dielectric ones)
- ASTRI Cam (Mini-Array)
- Chec-s Cam (CTA SST)
- "regular" observing of Crab, few MRK sources, Targets of opportunity

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Sky conditions

In the last years:

Usable night > 50% clear, 150-160 night/year

Usable night < 50% clear, 30-40 night/year

Colacevich 60 n/year (no assistants)
APT2 180 n/year

Sky luminosity without moon:

h	U	B	V
90°	21.43 +/-0.07	21.20 +/-0.07	20.85 +/-0.06
50°	21.24 +/-0.15	20.95 +/-0.16	20.62 +/-0.16
30°	21.00 +/-0.22	20.63 +/-0.24	20.27 +/-0.25

Magnitude/arcsec^2

SLN

Scientific and technological production highlights

20 paper/year, mostly within international collaborations

Photometry@SLN

A&A 622, A193 (2019)
https://doi.org/10.1051/0004-6361/201834868
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Astronomy & Astrophysics

HADES program (GAPS)

HADES RV program with HARPS-N at the TNG

IX. A super-Earth around the M dwarf GI 686★,★★

L. Affer[1], M. Damasso[2], G. Micela[1], E. Poretti[3,4], G. Scandariato[5], J. Maldonado[1], A. F. Lanza[5], E. Covino[6], A. Garrido Rubio[1], J. I. González Hernández[7,8], R. Gratton[9], G. Leto[5], A. Maggio[1], M. Perger[10,11], A. Sozzetti[2], A. Suárez Mascareño[7,12], A. S. Bonomo[2], F. Borsa[3], R. Claudi[9], R. Cosentino[4], S. Desidera[9], P. Giacobbe[2], E. Molinari[13], M. Pedani[4], M. Pinamonti[2], R. Rebolo[7,8], I. Ribas[10,11], and B. Toledo-Padrón[7,8]

A&A 633, A99 (2020)
https://doi.org/10.1051/0004-6361/201935097
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GAIA Alerts

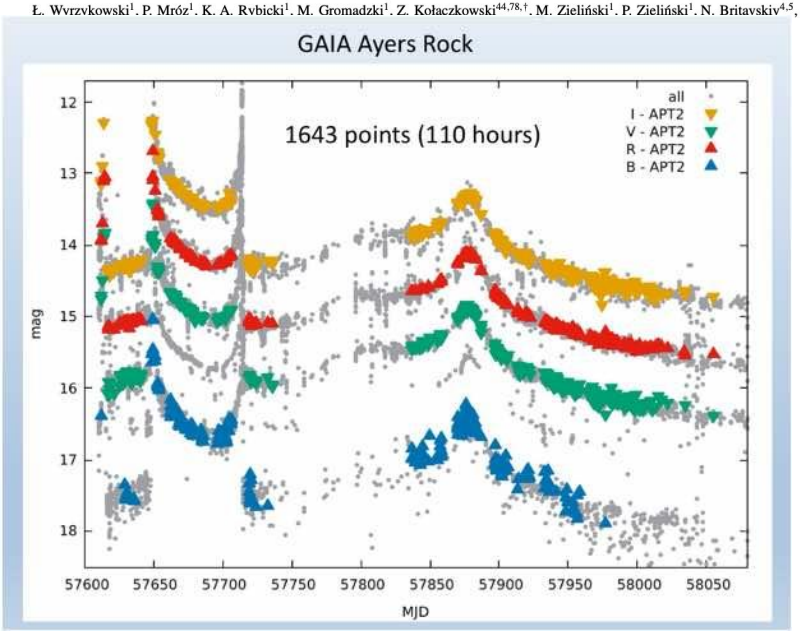
450 days monitoring

Astronomy & Astrophysics

Astronomy & Astrophysics manuscript no. output
May 10, 2021
©ESO 2021

Full orbital solution for the binary system in the northern Galactic disc microlensing event Gaia16aye★

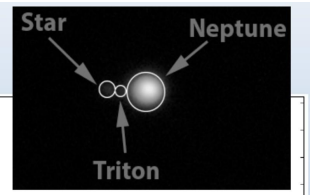
Ł. Wyrzykowski[1], P. Mróz[1], K. A. Rybicki[1], M. Gromadzki[1], Z. Kołaczkowski[44,78,†], M. Zieliński[1], P. Zieliński[1], N. Britavskiy[4,5],



Structure and evolution of Triton's atmosphere from the 5 October 2017 stellar occultation and previous observations

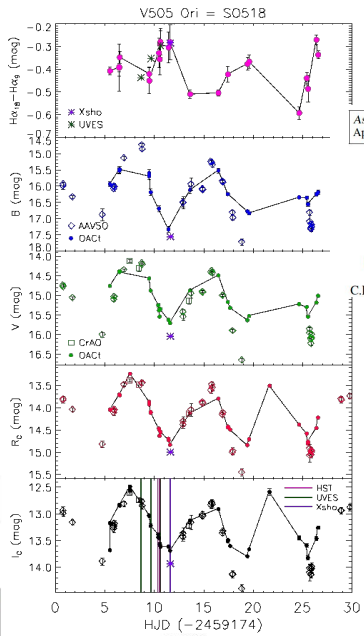
J. Marques Oliveira[1], B. Sicardy[1], A. R. Gomes-Júnior[2,3], J. L. Ortiz[4], D. F. Strobel[5], T. Bertrand[1,6], F. Forget[7], E.

Occultation by Triton



Few minutes obs

Paper in preparation



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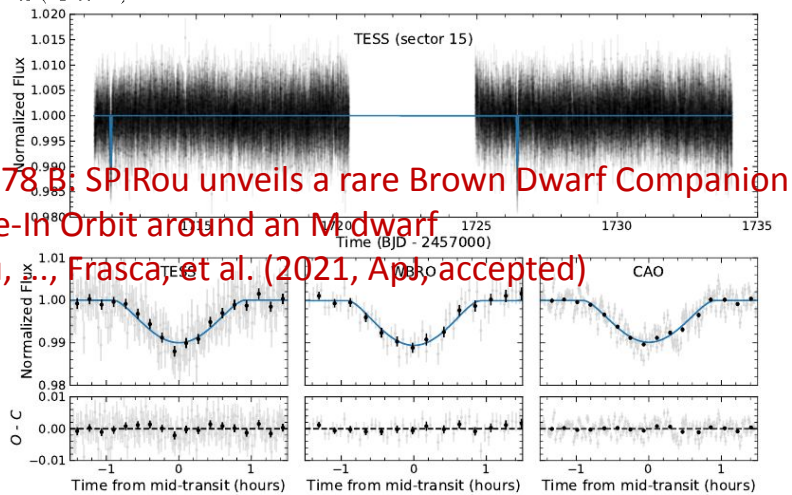
Astronomy & Astrophysics manuscript no. penellope_paperI_orion_accepted_langed_arxiv
April 7, 2021
©ESO 2021

PENELLOPE: The ESO data legacy program to complement the Hubble UV Legacy Library of Young Stars (ULLYSES)

I. Survey presentation and accretion properties of Orion OB1 and σ-Orionis★

C.F. Manara[1], A. Frasca[2], L. Venuti[3], M. Siwak[4], G.J. Herczeg[5], N. Calvet[6], J. Hernandez[7], Ł. Tychoniec[1], M. Gangi[8],

PENELLOPE collaboration



TOI–1278 B: SPIRou unveils a rare Brown Dwarf Companion in Close-In Orbit around an M dwarf

Artigau, .., Frasca, et al. (2021, AJ, accepted)

Figure 1. *Top panel*: TOI–1278 normalized PDCSAP light curve from sector 15. The gap in the middle of the light curve is due to data downlink when TESS is close to perigee. *Lower panels*: TESS, WBRO, and CAO transit light curves. The black points represent binned data (10 min temporal bin). The blue curves are the best-fit transit model, as discussed in Section 4. Only the baseline flux and the limb-darkening coefficients vary between the three data sets. For each instrument, the residuals (Observed - Calculated) are shown below the transit. The TESS data set is phase-folded and covers two transits.

SLN

Scientific and technological production highlights

SPETTROSCOPIA STELLARE CON CAOS@SLN

Gianni Catanzaro & CAOS Team (F. Leone, I. Busà, A. Frasca, M. Giarrusso, M. Munari)

Spectropolarimetry@SLN

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CAOS spectroscopy of Am stars *Kepler* targets*

G. Catanzaro,[1†] V. Ripepi,[2] K. Biazzo,[1] I. Busá,[1] A. Frasca,[1] F. Leone,[1,3] M. Giarrusso,[1,3] M. Munari[1] and S. Scuderi[1]

HD 226766: a hierarchical SB3 system with two twin Am stars

G. Catanzaro,[1*] M. Gangi,[2] M. Giarrusso,[3] M. Munari[1] and F. Leone[1,2]

KIC 7599132: an ellipsoidal variable in a close SB1 system

G. Catanzaro,[1*] A. Frasca,[1] M. Giarrusso,[2] V. Ripepi,[3] F. Leone,[1,4] E. Tognelli,[5,6] M. Munari[1] and S. Scuderi[1]

Spectroscopic study of the HgMn star HD 49606: the quest for binarity, abundance stratifications and magnetic field

G. Catanzaro,[1*] M. Giarrusso,[2,1] F. Leone,[2,1] M. Munari,[1] C. Scalia,[2,1] E. Sparacello[2] and S. Scuderi[1]

The behaviour of chemical elements in 62 Am star candidates

G. Catanzaro,[1*] I. Busà,[1] M. Gangi,[2] M. Giarrusso,[3] F. Leone[1,2] and M. Munari[1]

Estimating the chromospheric magnetic field from a revised NLTE modelling: the case of HR 7428

I. Busá,[1*] G. Catanzaro,[1] A. Frasca,[1] M. Gangi,[1,2] M. Giarrusso,[1,2] F. Leone,[1,2]

Evidence of vertical abundance stratification in the SB1 star HD 161660: a new HgMn

G. Catanzaro,[1*] M. Giarrusso,[2] M. Munari[1] and F. Leone[1,3]

Efficienza
CAOS@91cm = FEROS@2.2ESO

Collaborazioni INAF

Evidence for radio and X-ray auroral emissions from the magnetic B-type star ρ Oph A

P. Leto,[1*] C. Trigilio,[1*] F. Leone,[2] I. Pillitteri,[3] C. S. Buemi,[1] L. Fossati,[4] F. Cavallaro,[1] L. M. Oskinova,[5,6] R. Ignace,[7] J. Krtička,[8] G. Umana,[1] C. Catanzaro,[1] A. Ingallinera,[1] F. Bufano,[1] C. Agliozzo,[9] N. M. Phillips,[9] L. Cerrigone,[10] S. Riggi,[1] S. Loru,[1] M. Munari,[1] M. Gangi,[1] M. Giarrusso[11] and J. Robrade[12]

***Kepler* observations of A–F pre-main-sequence stars in Upper Scorpius: discovery of six new δ Scuti and one γ Doradus stars**

V. Ripepi,[1*] L. Balona,[2] G. Catanzaro,[1*] M. Marconi,[1*] F. Palla[4] and M. Giarrusso[5]

Collaborazioni internazionali

A spectroscopic study of the open cluster NGC 6250

A. J. Martin,[1,2*] M. J. Stift,[1] L. Fossati,[3] S. Bagnulo,[1*] C. Scalia,[4,5] F. Leone[4,5] and B. Smalley[2]

The single-sided pulsator CO Camelopardalis

D. W. Kurtz,[1,2*] G. Handler,[3*] S. A. Rappaport,[4*] H. Saio,[5] J. Fuller,[6] T. Jacobs,[7] A. Schmitt,[8] D. Jones,[9,10] A. Vanderburg,[11] D. LaCourse,[12] L. Nelson,[13] F. Kahraman Aliçavuş,[3,14] and M. Giarrusso[15]

Catania Astrophysical Observatory Spectropolarimeter organizing the "unknown knowns"

CAOS

Francesco Leone

First direct measurement of the Magnetic Field Transverse Component from derivatives of the Stokes line profiles

A Method to Measure the Transverse Magnetic Field and Orient the Rotational Axis of Stars

Francesco Leone[1], Cesare Scalia[1], Manuele Gangi[1], Marina Giarrusso[1], Matteo Munari[2], Salvatore Scuderi[2], Corrado Trigilio[2], and Martin J. Stift[3]

[1] Università di Catania, Dipartimento di Fisica e Astronomia, Sezione Astrofisica, Via S. Sofia 78, I-95123 Catania, Italy
[2] INAF—Osservatorio Astrofisico di Catania, Via S. Sofia 78, I-95123 Catania, Italy
[3] Armagh Observatory, College Hill, Armagh BT61 9DG, Northern Ireland

Received 2016 June 9; revised 2017 September 14; accepted 2017 September 14; published 2017 October 20

First evidence of atom level alignment due to radiation anisotropy (Alfed Kastler Nobel Prize in 1966)

The Polarisation Angle γ of spectral lines changes with the orbital phase

The solar-like 'Second Spectrum' and polarized metal lines in the emission of the post-AGB binary 89 Herculis

F. Leone,[1,2*] M. Gangi,[1,2] M. Giarrusso,[3] C. Scalia,[2] M. Cecconi,[4] R. Cosentino,[4] A. Ghedina,[4] M. Munari[2] and S. Scuderi[2]

[1] Università di Catania, Dipartimento di Fisica e Astronomia, Sezione Astrofisica, Via S. Sofia 78, I-95123 Catania, Italy
[2] INAF – Osservatorio Astrofisico di Catania, Via S. Sofia 78, I-95123 Catania, Italy
[3] INFN – Laboratori Nazionali del Sud, Via S. Sofia 62, I-95123 Catania, Italy
[4] INAF – Fund. Galileo Galilei, Rambla José Ana Fernández Perez 7, 38712 Breña Baja (La Palma), Canary Islands, Spain

The Ultimate Measurement of Magnetic Fields

in 5 years
from literature
100 Gauss → → → → 1 Gauss → → → → Sub-Gauss
(33 mmGauss of 89 Her)

The multi-line slope method for measuring the effective magnetic field of cool stars: an application to the solar-like cycle of ϵ Eri

C. Scalia,[1,2*] F. Leone,[1,2*] M. Gangi,[1,2*] M. Giarrusso[1,2] and M. J. Stift[3]

Discovery of Ground-state Absorption Line Polarization and Sub-Gauss Magnetic Field in the Post-AGB Binary System 89 Her

Heshou Zhang[1,2], Manuele Gangi[3,4], Francesco Leone[5], Andrew Taylor[1], and Huirong Yan[1,2,6]

[1] Deutsches Elektronen-Synchrotron DESY, Platanenallee 6, D-15738 Zeuthen
[2] Institut für Physik und Astronomie, Universität Potsdam, Haus 28, Karl-Liebknecht-
[3] INAF - Osservatorio Astrofisico di Catania, Via S. Sofia 78, I-
[4] INAF - Osservatorio Astronomico di Roma, Via Frascati 33, I-00078
[5] Università di Catania, Dipartimento di Fisica e Astronomia, Sezione Astrofisica,

Received 2020 February 4; revised 2020 July 20; accepted 2020 September

SLN
Scientific and technological production highlights

ASTRI-Horn@SLN

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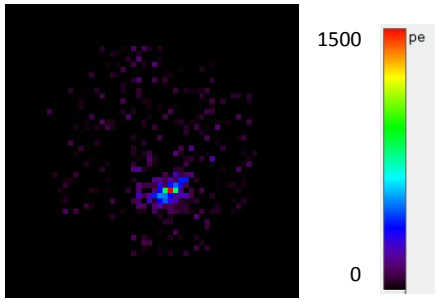
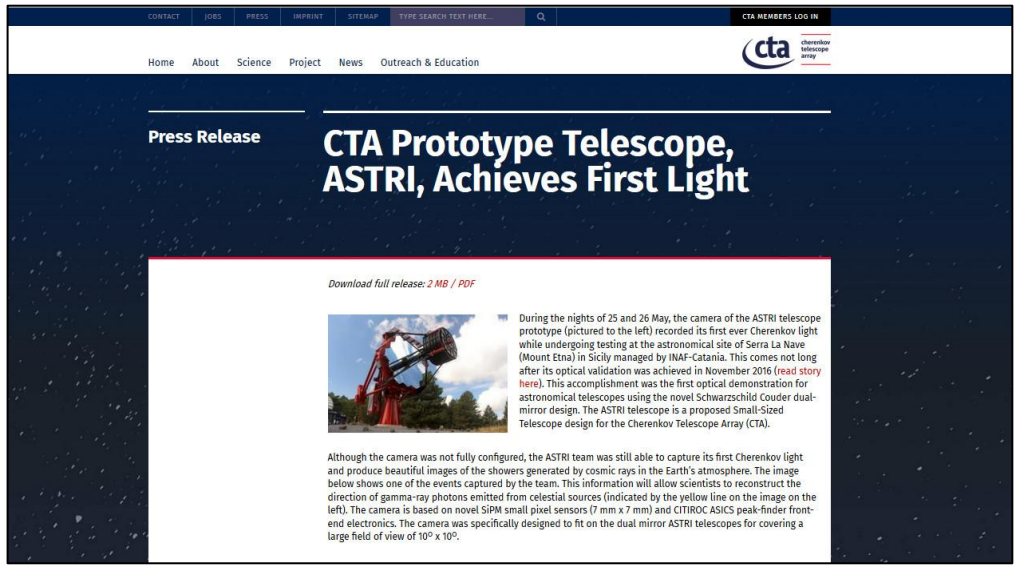
25th of May 2017
First Cherenkov light with the ASTRI camera





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Press Release

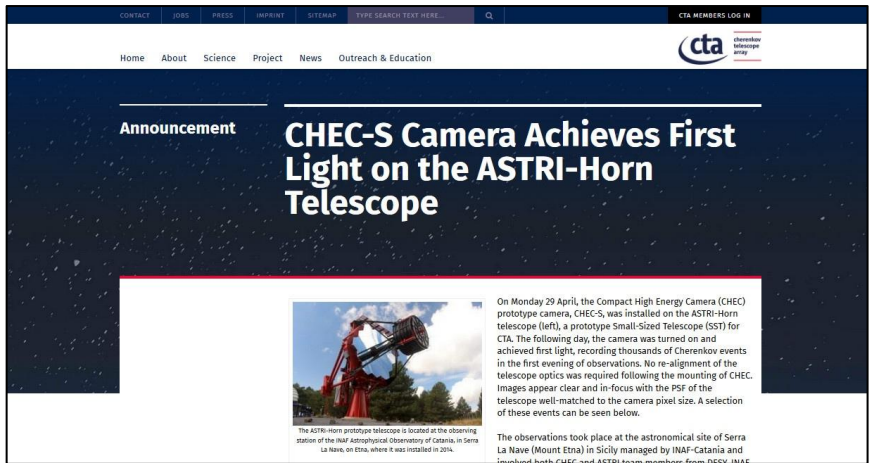
CTA Prototype Telescope, ASTRI, Achieves First Light

Download full release: 2 MB / PDF

During the nights of 25 and 26 May, the camera of the ASTRI telescope prototype (pictured to the left) recorded its first ever Cherenkov light while undergoing testing at the astronomical site of Serra La Nave (Mount Etna) in Sicily managed by INAF-Catania. This comes not long after its optical validation was achieved in November 2016 (read story here). This accomplishment was the first optical demonstration for astronomical telescopes using the novel Schwarzschild Couder dual-mirror design. The ASTRI telescope is a proposed Small-Sized Telescope design for the Cherenkov Telescope Array (CTA).

Although the camera was not fully configured, the ASTRI team was still able to capture its first Cherenkov light and produce beautiful images of the showers generated by cosmic rays in the Earth's atmosphere. The image below shows one of the events captured by the team. This information will allow scientists to reconstruct the direction of gamma-ray photons emitted from celestial sources (indicated by the yellow line on the image on the left). The camera is based on novel SiPM small pixel sensors (7 mm x 7 mm) and CITIROC ASICS peak-finder front-end electronics. The camera was specifically designed to fit on the dual mirror ASTRI telescopes for covering a large field of view of 10° x 10°.

29th April 2019
First Cherenkov light with the CHEC-S camera



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Announcement

CHEC-S Camera Achieves First Light on the ASTRI-Horn Telescope

The ASTRI-Horn prototype telescope is located at the observing station of the INAF Astrophysical Observatory of Catania, in Serra La Nave, on Etna, where it was installed in 2014.

On Monday 29 April, the Compact High Energy Camera (CHEC) prototype camera, CHEC-S, was installed on the ASTRI-Horn telescope (left), a prototype Small-Sized Telescope (SST) for CTA. The following day, the camera was turned on and achieved first light, recording thousands of Cherenkov events in the first evening of observations. No re-alignment of the telescope optics was required following the mounting of CHEC. Images appear clear and in-focus with the PSF of the telescope well-matched to the camera pixel size. A selection of these events can be seen below.

The observations took place at the astronomical site of Serra La Nave (Mount Etna) in Sicily managed by INAF-Catania and

A&A 634, A22 (2020)
https://doi.org/10.1051/0004-6361/201936791

Astronomy & Astrophysics

First detection of the Crab Nebula at TeV energies with a Cherenkov telescope in a dual-mirror Schwarzschild-Couder configuration: the ASTRI-Horn telescope

S. Lombardi[1,2,⋆], O. Catalano[3,⋆], S. Scuderi[4,⋆], L. A. Antonelli[1,2], G. Pareschi[5], E. Antolini[6], L. Arrabito[7],

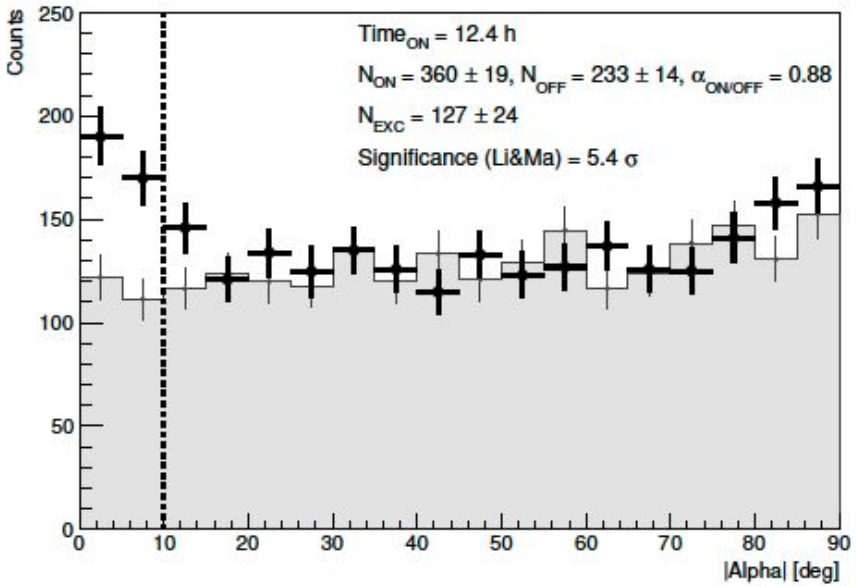

Fig. 2. |*Alpha*|-distributions of the Crab Nebula (ON, black) and the background (OFF, grey) data from ASTRI-Horn observations taken between 5 and 11 December 2018 above an energy threshold of ~3 TeV. The region between zero and the vertical dashed line (at 10°) represents the fiducial signal region.

SLN

Funds, plans, critical issues

Funds:
2021: 148 k€
(including additional funds for new power grid connection)
2010-2017 FFO down to 20k

Plans:
- **power line upgrade grid connection**
- **foresteria (additional planned improvements)**
- **ASTRI-Horn**
- **”porting” telescope software Colacevich&APT2**

Critical issue
No turn over tech staff, skills loss in 2 years irreversible

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Buildings maintenance, done

ENEL Grid connection 2021/22








Thermal power plant, done (VS project)


Generator, done

Campo Imperatore
instrumentation and capabilities

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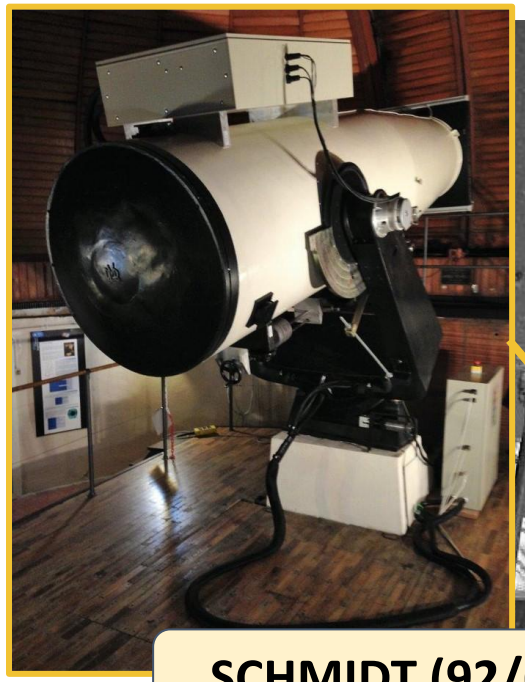
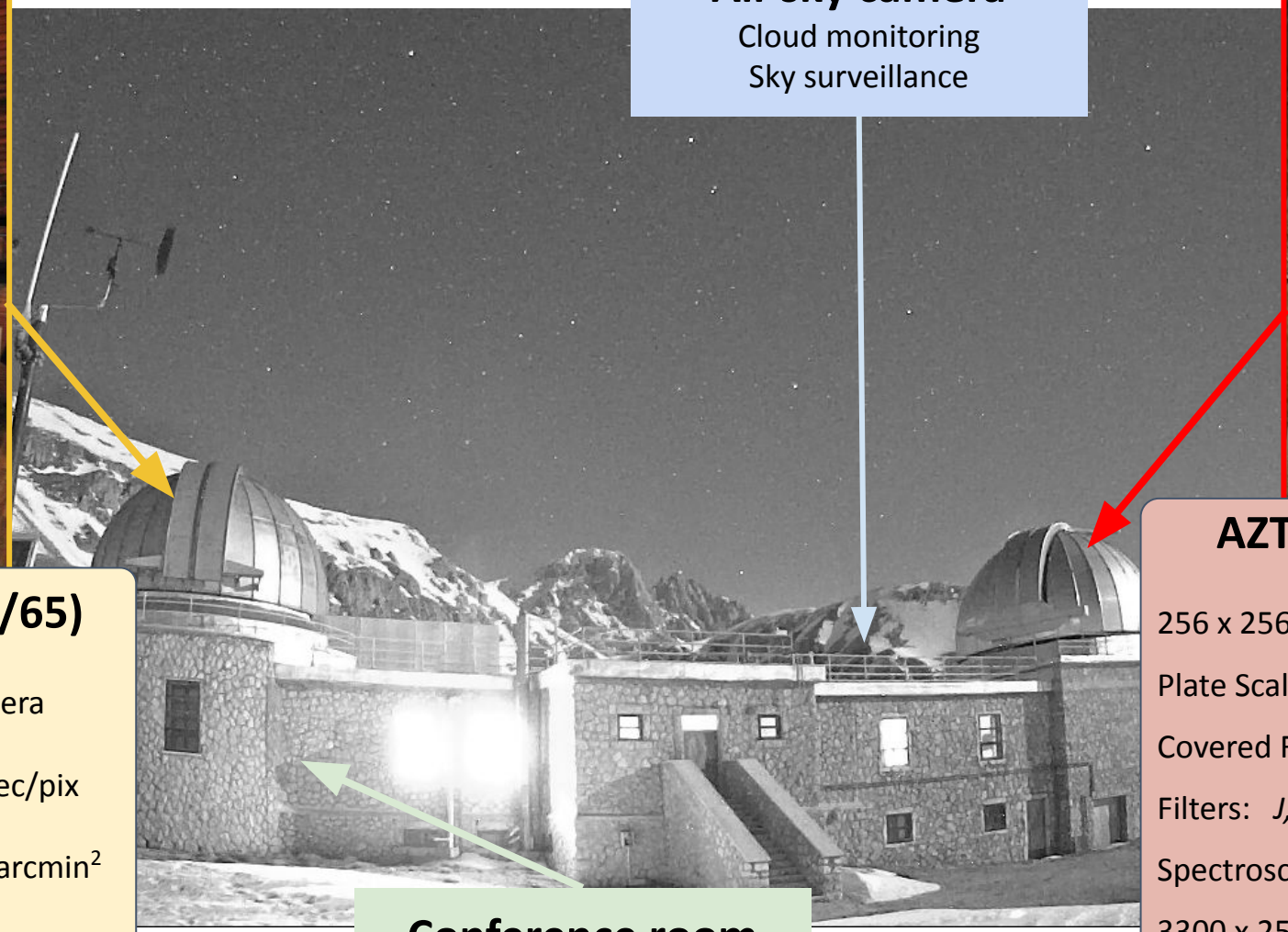




All-sky camera
Cloud monitoring
Sky surveillance

SCHMIDT (92/65)

4096 x 4096 CCD Camera

Plate Scale: 1.02 arcsec/pix

Covered FoV: 70 x 70 arcmin^2

Filters: SLOAN *u, g, r, i, z*

Conference room
Public outreach activities

AZT-24 (R-C 110)

256 x 256 HgCdTe NIR Camera

Plate Scale: 1.04 arcsec/pix

Covered FoV: 4 x 4 arcmin^2

Filters: *J, H, K, K' + narrowband*

Spectroscopy: *I+J, H+K, R~220*

3300 x 2500 CCD camera

Filters: Kron-Cousins *V, R, I*

Campo Imperatore

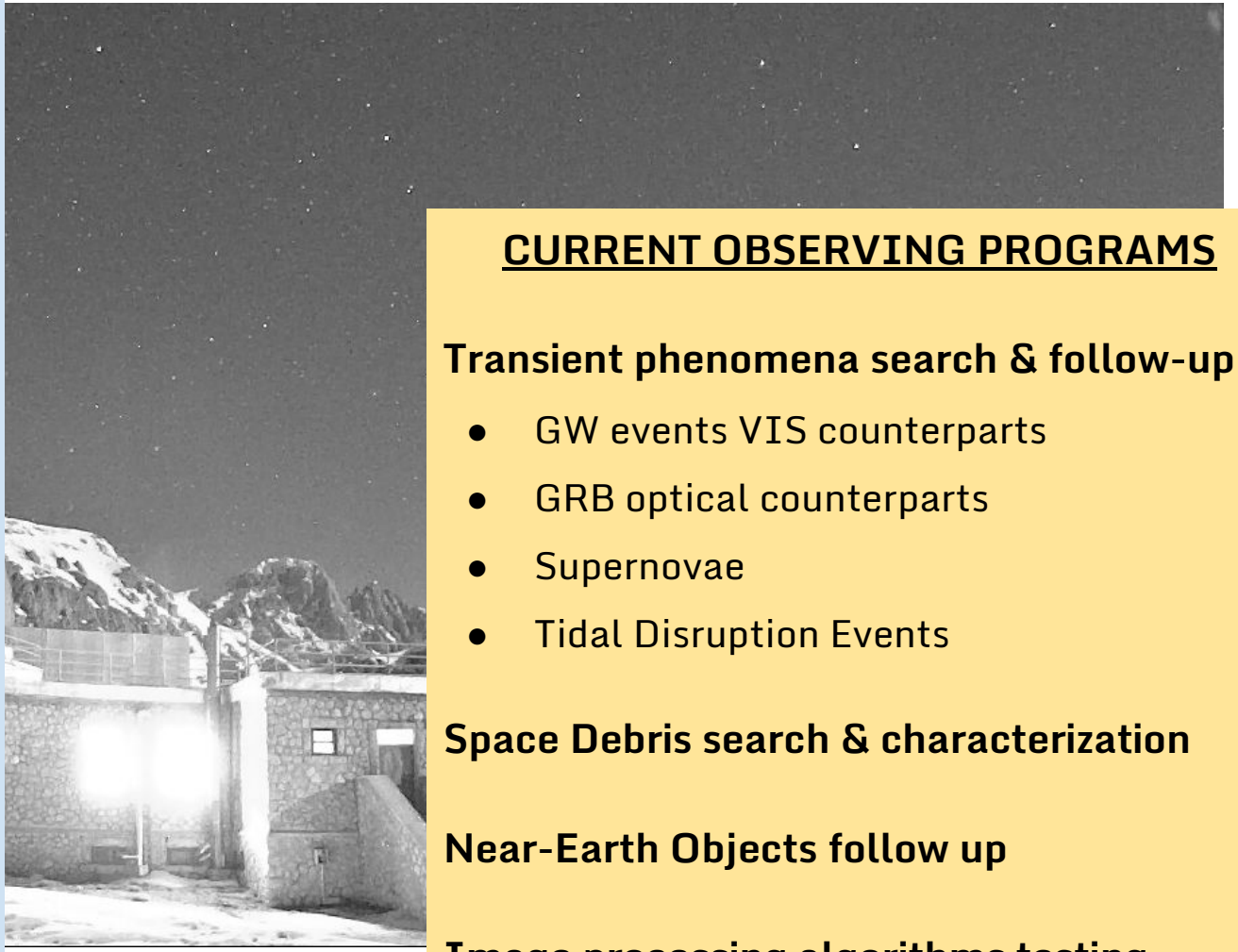
team organization and current projects

M. Canzari
software management
F. De Luise
observation management
M. Dolci
instrumentation program
G. Valentini
infrastructure & logistics, O&E

N. Napoleone, P. Tedesco
night assistants

R. Carini (*) F. Onori
(remote) observers

M. Quintini
hw/sw maintenance
A. Di Cianno, A. Valentini, L. Pacinelli
technical support



CURRENT OBSERVING PROGRAMS

Transient phenomena search & follow-up:

- GW events VIS counterparts
- GRB optical counterparts
- Supernovae
- Tidal Disruption Events

Space Debris search & characterization

Near-Earth Objects follow up

Image processing algorithms testing

Campo Imperatore
instrumentation program

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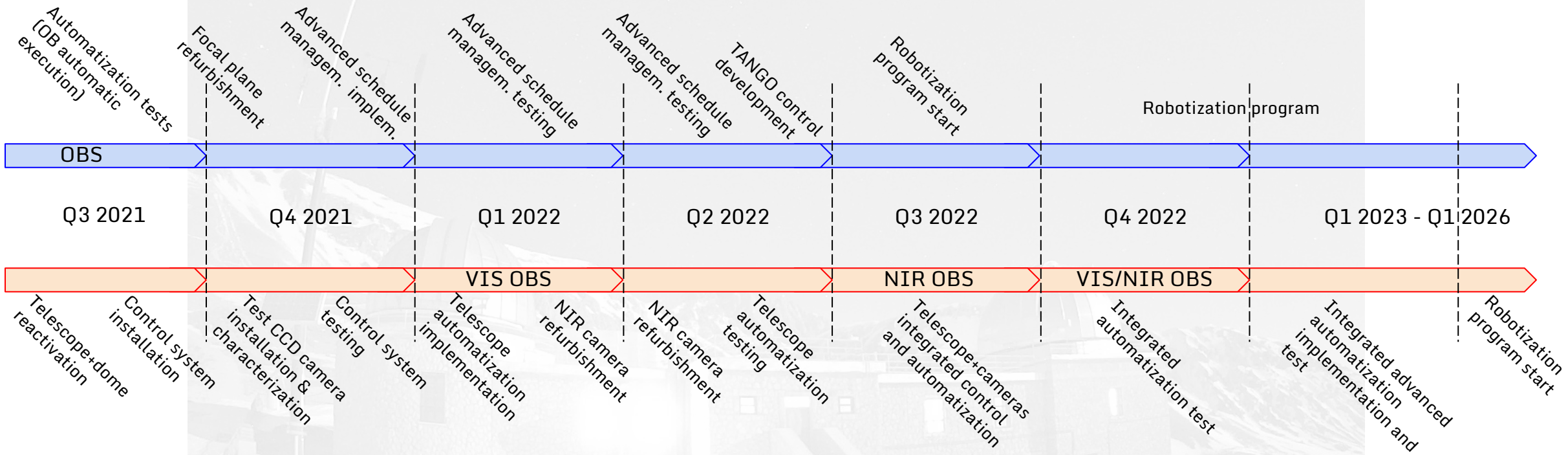
SCHMIDT system



AZT-24 system

Campo Imperatore
towards a global control software

INAF - OAAb technology group has acknowledged skill in software engineering.

Starting from the experience with the TANGO Control Framework, gathered (and in continuous advancement) in the context of the SKA and LOFAR2 Projects, a program aimed at *controlling the Campo Imperatore instrumentation with TANGO* has been conceived and is currently under definition.

The extended purpose is to put all the devices in the Campo Imperatore station under TANGO: these include not only the telescopes, but all the sensors and devices for monitoring and controlling the overall infrastructure.

A further step will be aimed at reaching the integrated control of ALL the telescopes of INAF - OAAb, including the three automatic telescopes (72cm, 40cm and an H-alpha 8cm solar telescope) in Teramo.

The final goal of the program is to get an integrated access to the control of a national distributed facility. Discussions to this aspect already started with Asiago.

Campo Imperatore

Strengths/criticalities

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STRENGTHS

- Site high-elevation makes it especially suitable for NIR observations. AZT24 is actually the only infrared telescope on the italian territory, and one of the only two on the continental Europe.
- Schmidt telescope is one of the only two Schmidt telescopes on the italian territory (together with Asiago). Its wide field makes it especially suitable for survey programs related to transients.
- Automatization and robotization program expected to greatly improve observability statistics.
- Roadmap to a fully robotic facility allowing wide- and narrow-field imaging plus spectroscopy, both in the visible and in the near-infrared.
- Campo Imperatore can be integrated with the other national observatories (Asiago, Loiano, SLN, ...) to create a national observing facility with common access and control.

CRITICALITIES

- Skilled manpower to be acquired, especially in the field of electronic engineering
- General skill on problems encountered by robotic instruments to be consolidated (but opportunity to get in touch with experienced teams (e.g. Asiago Schmidt))
- Regular funding to be ensured, especially for the final part of the robotization program (where crucial technical interventions could be necessary) and, in general, for the maintenance of the instrumentation - remind that, e.g., MTBF is given for elevations below 2000 m.