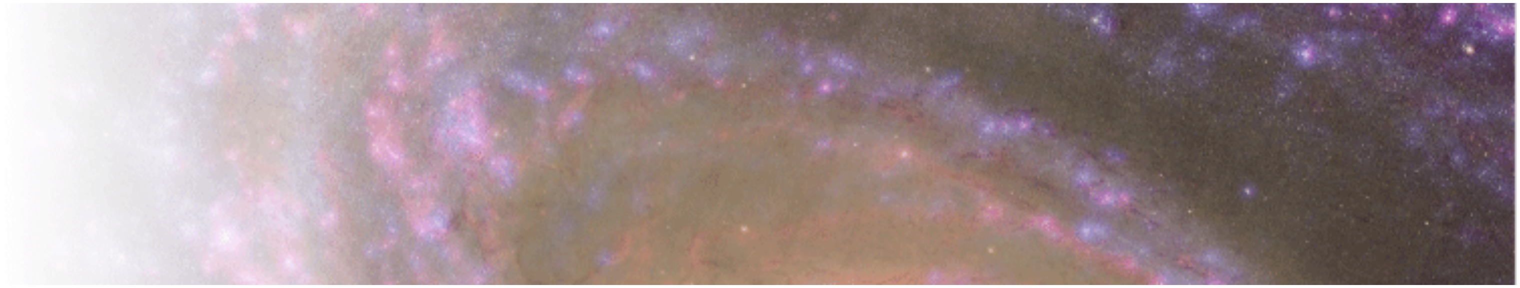
SEXTEN CENTER FOR ASTROPHYSICS

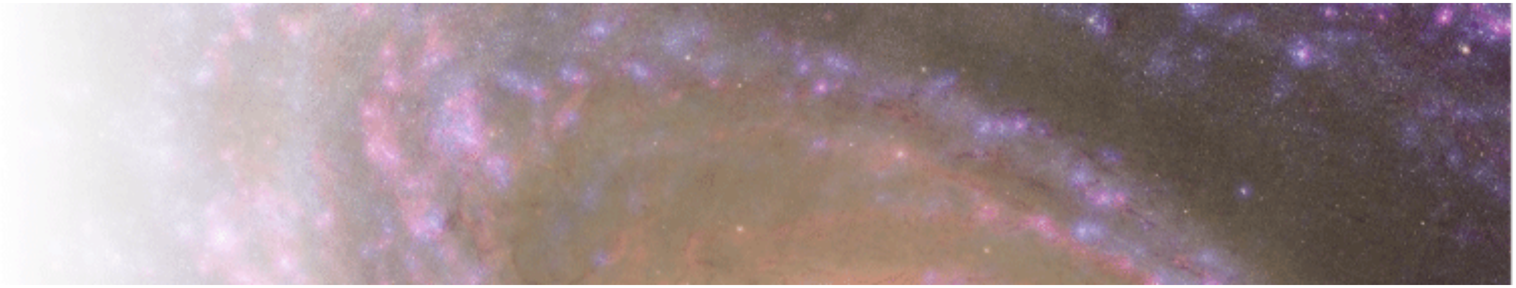


Hands-on the Extreme Universe with High Energy Gamma-ray data

18.07.2022 - 22.07.2022

Sexten – Dolomites Italy

- A beatiful location !



- Thanks to the Organising Committee (Giacomo, Chiara, Giacomo, Patrizia, Nico and Gino)
- Thanks to the HandsOn tutors (Fabio, Giacomo, Gonzalo, Andrea and Martina)
- Thanks to Gabriella Deconi and the Sexten Center soon dedicated to Riccardo Giacconi
- Thanks to our 'supporters'

- Overview of the program!
  - The Extreme Universe
    - Fermi, current IACTs, LHAASO
  - Next Generation IACT telescopes
    - LST, MST, SCT, ASTRI-SST
  - Theory of VHE sources
    - CR sources, AGN, GRB, PSR-PWN, ALPs
  - Science with Cherenkov Telescopes
    - Transients, Galactic, Extragalactic, DarkMatter, CR
  - Multiwavelength and MultiMessenger connections
    - eROSITA, IXPE, SKA, Neutrinos, GW
  - Special talk – 25 years of GRB afterglows

The Extreme Universe

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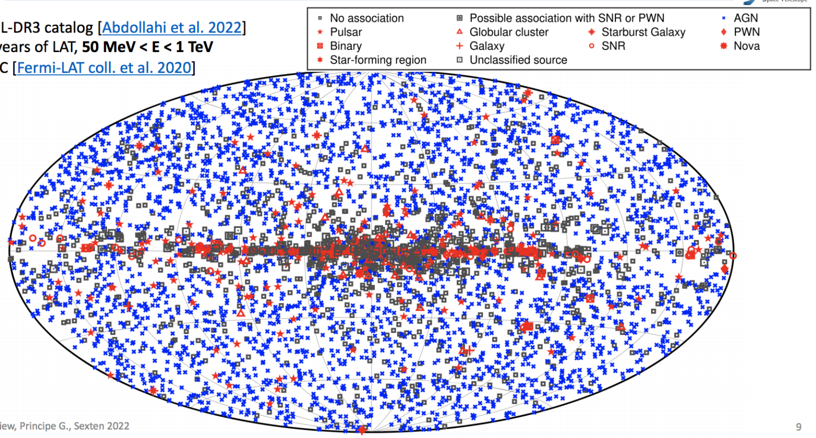
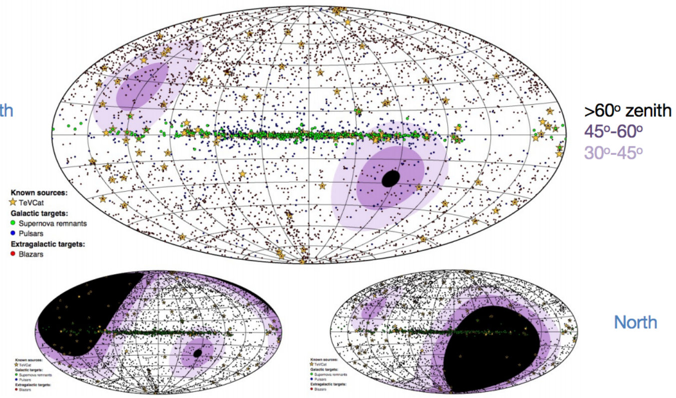
More than 6500 sources detected in first 12 years

4FGL-DR3 catalog [Abdollahi et al. 2022]
12 years of LAT, **50 MeV < E < 1 TeV**
4LAC [Fermi-LAT coll. et al. 2020]



Fermi: G.Principe

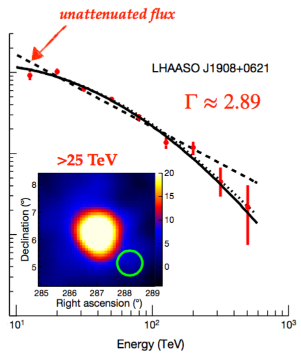
DESIGN DRIVER: FULL-SKY COVERAGE



CTA: W.Hofmann

The first SNR as PeVatron?

LHAASO J1908+0621 = SNR G40.5-0.5 + GMC ?



One of the most intriguing sources in the Galactic plane. MGRO J1908+06 spatially associates with an *IceCube hotspot of neutrino emission*. Although the hotspot is not significant yet, this suggests a *possible hadronic origin of the observed gamma-ray radiation.*

Highest energy photon 0.45 PeV => Ep > 2 PeV

confirmation of association with G40.5-0.5 would be *the first evidence of a SNR operating as PeVatron*

soon LHAASO will announce detection of UHE γ-rays from W51 and γCygni
=> new developments are anticipated with exciting implications

LHAASO: G.Di Sciascio

The Extreme Universe

Science with CTA

CTA will have important synergies with many of the new generation of major astronomical an ticle observatories. Multi-wavelength and multi-messenger approaches combining CTA data from other instruments will lead to a deeper understanding of the broad-band non-therma of target sources, elucidating the nature, environment, and distance of gamma-ray emitters synergies in each waveband are presented.

https://arxiv.org/abs/1709.07997

CTA: F.Longo

ASTRI: A.Giuliani

ASTRI Science : overview

ASTRI Mini-Array

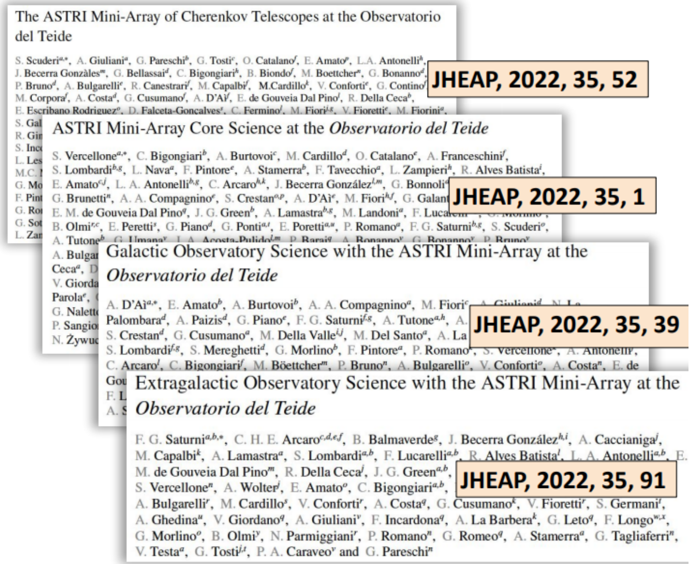
Origin of Cosmic Rays

- PeVatrons
- CRs Acceleration and Propagation
- Pulsar Wind Nebulae and TeV Halos

Fundamental Physics

- Intergalactic fields
- Blazars
- LIV and ALP

Transient Follow-Up



Next Generation IACT

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Summary — LST: M.Teshima

cta cherenkov telescope array

- There have always been some problems in the society and world, Pandemic, Volcano eruptions, Price increases, and Shortage of materials.
- Nevertheless, I appreciate our young colleagues' continuous development of Software and Hardware.
- We should also continue to work to achieve our goal of a high-performance all-sky observatory with LSTs. PNRR program will make it a reality.
- LSTs are telescopes for observations of GRBs, transient sources, multi-messenger astronomy, Gravitational-wave sources, High-Energy neutrino sources, and Search for Dark Matters.
- Surely the CTA consortium should start to work to establish a scientific network with observatories' working in other wavelengths and messengers.

- **Great Scientific results are waiting for you!!**

Conclusion and « take home messages » — MST: J-F. Glicenstein

cta cherenkov telescope array

- The instrumental requirements on MST structures and cameras follow from the
- physics requirements of CTA.

- The MST telescopes use a common mechanical Davies-Cotton and 2 cameras designs: NectarCAM (CTAN) and FlashCam (CTAS).

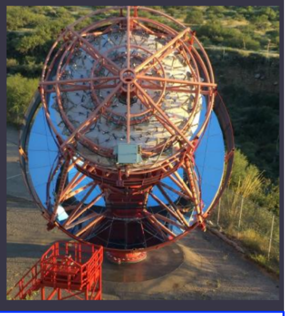
- A prototype of Davies-Cotton structure has been implemented near Berlin in 2012 and extensively tested.
- NectarCAM and FlashCam fulfill all CTA requirements and have comparable performances.
- The FlashCam camera uses off-the-shelf component with a photon detection plane and electronics racks. It had its first light in 2017. A FlashCam is succesfully operated since October 2019 on the CT5 telescope of H.E.S.S.
- The NectarCAM camera has a modular structure based on the Nectar ASIC. It has its first light in 2019.

- The installation will follow the « pathfinder » strategy before acceptance of telescopes by CTA.
- The first telescopes should be installed on CTAN and CTAS in 2023-2024.

MST-Sexten 07/22 33

SCT Summary and Outlook — SCT: E.Bissaldi

- **Recent results**
  - Improved optics alignment
  - First measurement of inclination-dependent PSF measurement
  - Further work on current camera to improve data analysis
  - Full-chain (FPM+SMART+FEE) measurements for camera upgrades
    - Production for full camera started
- **Next steps**
  - Continued commissioning, engineering, and operations
  - Improvements in Optical System (alignments and off-axis PSF)
  - Camera upgrade
    - Production and installation of upgraded sensors and electronics
  - Discussions with CTAO Project Office
    - Infrastucture planning and budgeting for SCT addition in CTA-S

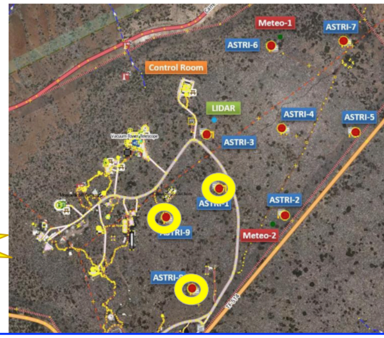


INFN BARI — E. Bissaldi — Sexten School for Astrophysics • 18 July 2022

The ASTRI Mini-Array Project — ASTRI & SST: G.Sironi

ASTRI Mini-Array

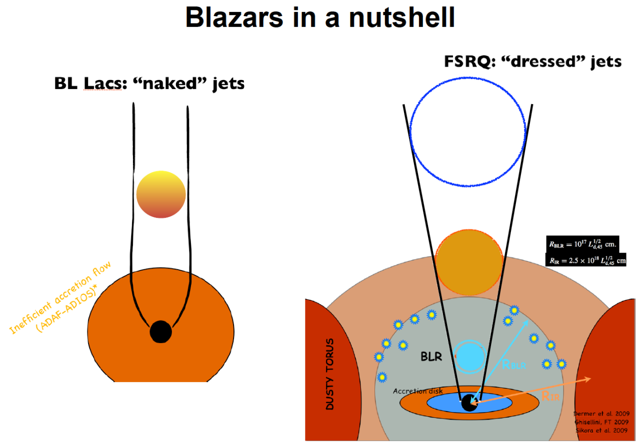
- June 2022 — Phase 0: 1 Telescope Structure, m-ICT
- Autumn 2022 — Phase 1: 3 Telescope Structures
- Late Spring 2023 — Phase 2: 3 Telescope Structures + Cameras — *Early observations*
- Autumn 2023 — Phase 3: Full Array
- End of 2024



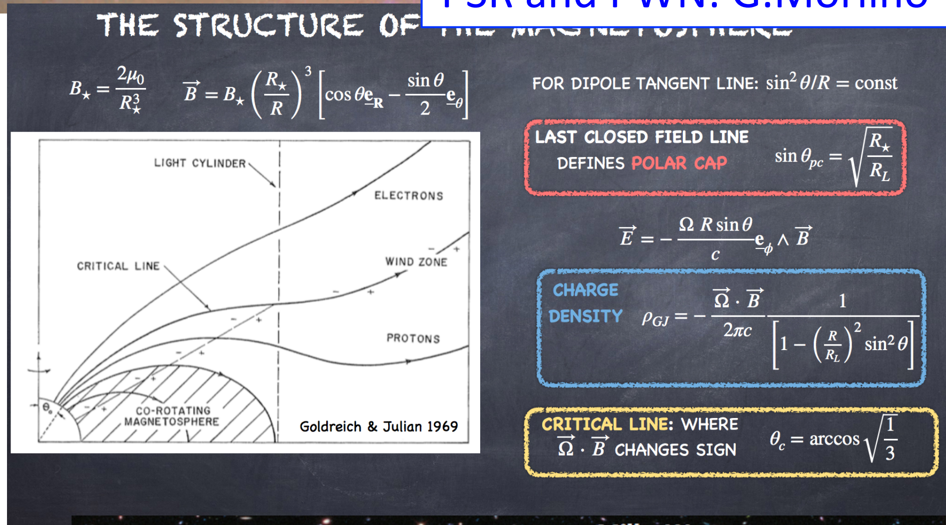
Giorgia Sironi – Hands on the extr

Theory of VHE sources

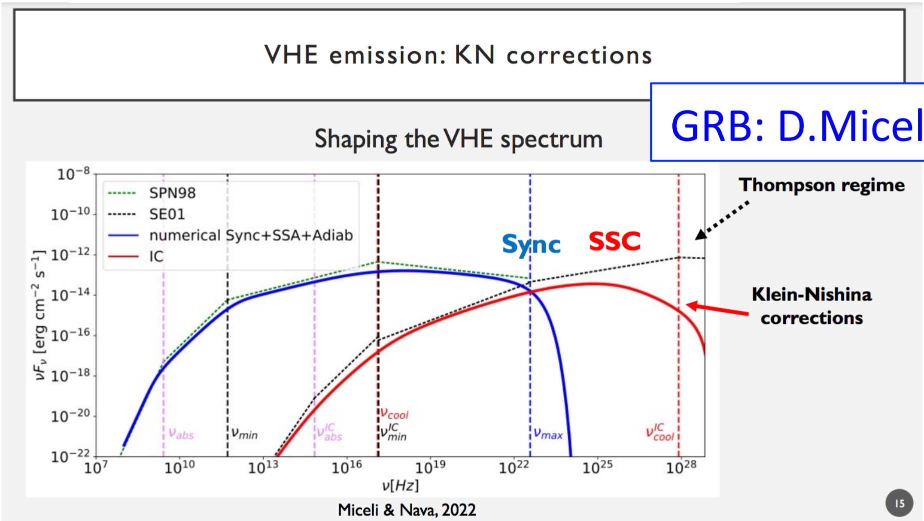
Blazars: F.Tavecchio/G.Bonnoli



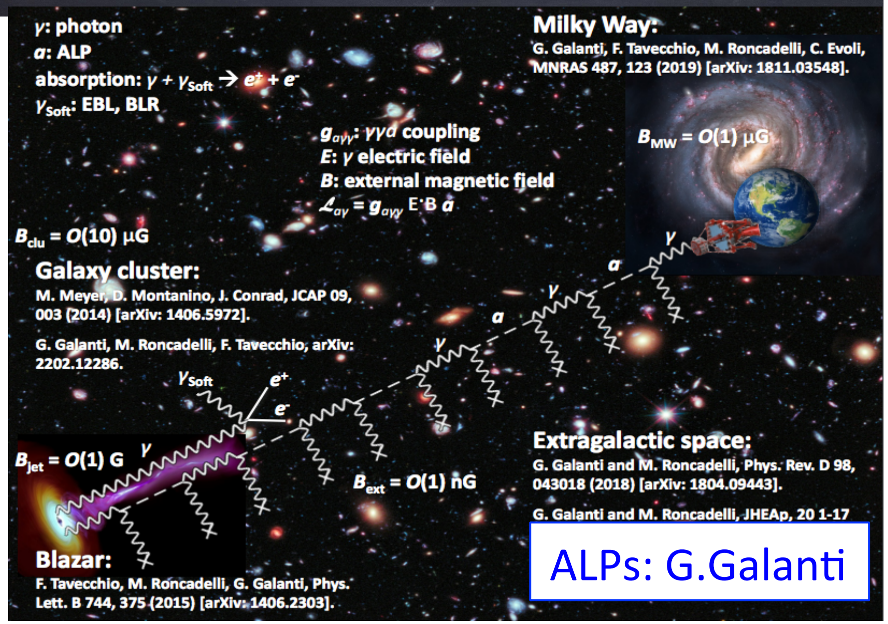
PSR and PWN: G.Morlino



GRB: D.Miceli



ALPs: G.Galanti



Science with Cherenkov Telescopes

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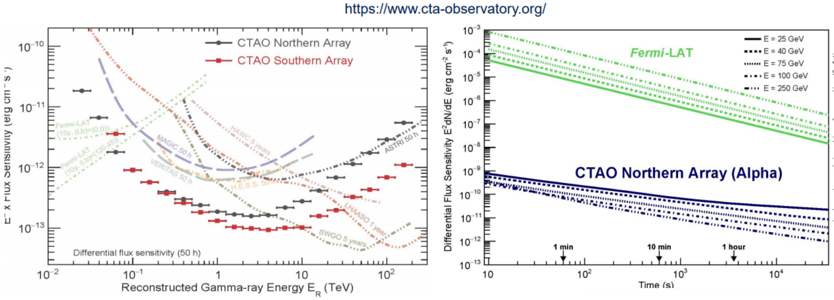
Transients: A.Berti

Studying transients with IACTs: why?

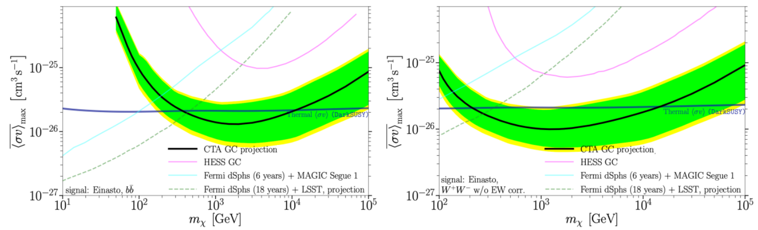
- They are very sensitive instrument on a broad energy range --> good characterization of spectra from ~20 GeV to several TeV for CTA
- They are fast instruments, sensitive to short duration events, detecting enough photons thanks to large collection area --> possibility to perform time analysis, searching for variability, change in spectrum, evolution of system

https://www.cta-observatory.org/



2022-07-20 Sexten Workshop 2022

Galactic center CTA Sensitivity



- Einasto profile 520 h

$$\rho_{DM} = \rho_s \exp\left[-\frac{\alpha}{2}\left(\left(\frac{r}{r_s}\right)^{\alpha} - 1\right)\right], \; J \sim 7.1 \times 10^{22} \mathrm{GeV}^2/\mathrm{cm}^5$$

- Main source of background : sources, Fermi Bubble, interstellar γ, residual CR

The CTA Consortium JCAP01(2021) 057 January 27, 2021 [arXiv:2007.16129]

Aldo Morselli INFN Roma Tor Vergata Hands-on the Extreme Universe, Sexten 20 July 2022 28

Dark Matter: A.Morselli

Object-oriented strategies

- If PeVatrons are SNRs (at age $\lesssim$ tens of ys as suggested by theory)
  - Look for emission from close-by clouds illuminated by escaping PeV particles
  - Look for young SNe in close-by galaxies to check for TeV-PeV emission
- Stellar Clusters
  - Very extended sources: require deep observations
- PWNe
  - High spatial resolution + high energy resolution
  - Hadronic contribution: combined analysis with ASTRI, LHAASO (or SWGO) only for powerful pulsars
- Giant magnetic islands
  - the most difficult case to detect: probably only diffuse emission will be detected
- Super-PeVatrons
  - Search of synchrotron emission due to secondaries with LSTs (in possible synergy with Fermi-LAT) [F. Aharonian suggestion]
- For PeVatron candidates High Night sky background deep observations can be done: they do not subtract observation time from other KSPs)
- Overlap with other KSPs: GC and Star-forming regions

Pevatrons: G.Morlino

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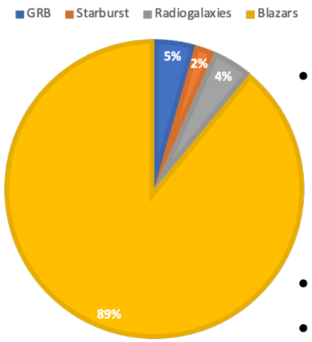
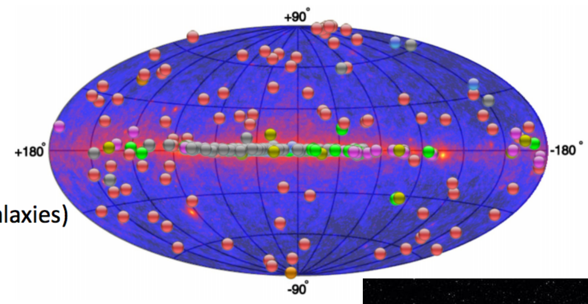
Science with Cherenkov Telescopes

Type of sources

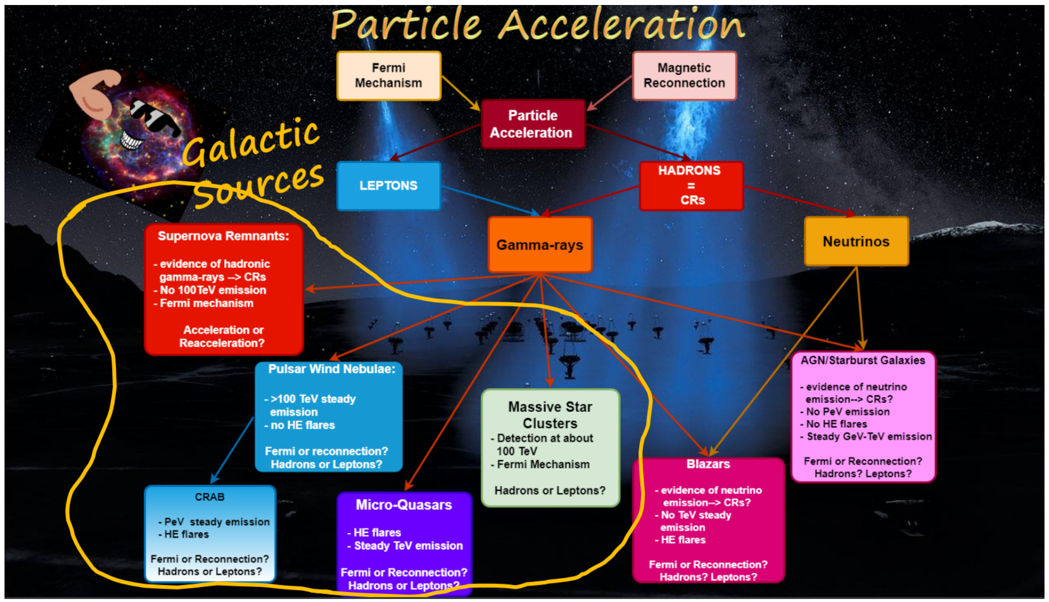


- AGN
  - Blazars
    - FSRQ
    - BL Lac
  - FRI (Radiogalaxies)
- GRB
- Starburst galaxies



EGAL: E.Prandini

Galactic: M.Cardillo



MultiMessenger Connections

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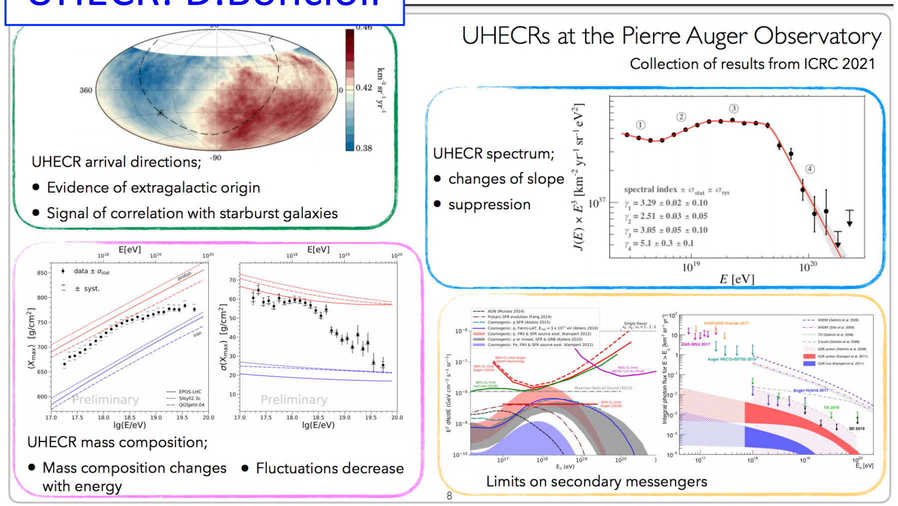
UHECR: D.Boncioli

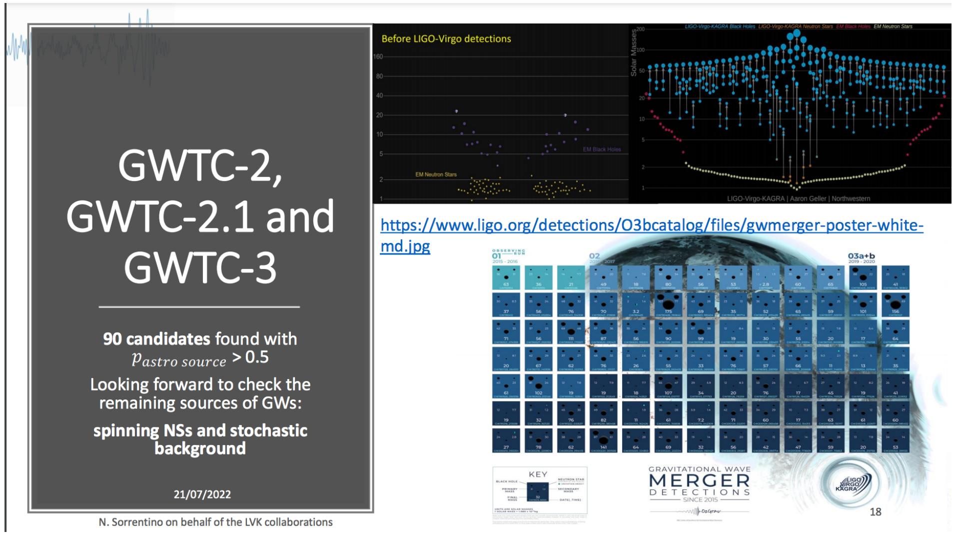


Some conclusions

- Diffuse neutrino flux is measured by several detectors and in several event selections (sensitive to different flavours and energy ranges).
  - This is not the cosmogenic CR flux.
  - This is (probably) not the "partner" of the EBL gamma flux (from p-p interactions).
- Several sources identification (TXS 0506+056, NGC 1068, M87, TXS GB6 J1542+6129, PKS 1424+240). They are of different types: blazar (BL Lac/FSRQ ?), Starburst galaxy...
- No dominant single sources and, probably, no dominant source type is responsible for this flux.
  - Current detector sensitivities are ≲order of magnitude below expected emissions from single (steady) sources.
  - We need stacking/catalogues search, transient searches. Collaboration with MM partners is essential.
  - Neutrino detectors are excellent for understanding source acceleration mechanisms.
  - The major part of the expected neutrino sources should be reachable with the next generation detectors.
    - EeV sensitive detectors have access to the guaranteed cosmogenic flux.

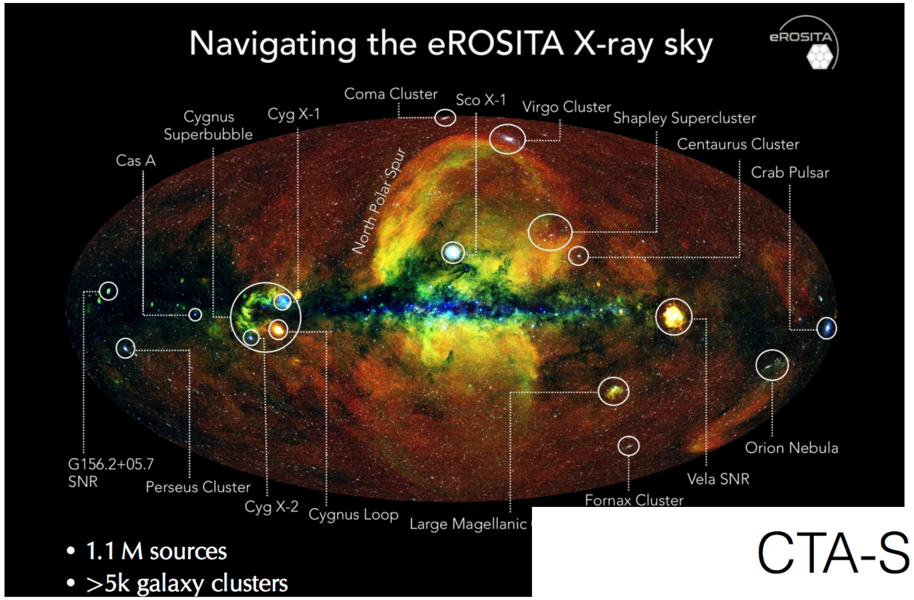
*This work has been supported by European Union's Horizon 2020 Programme under the **AHEAD2020 project** (grant agreement n. 871158).*

Neutrino: V.Kulikovskij



GW: N.Sorrentino

MultiWavelength Connections

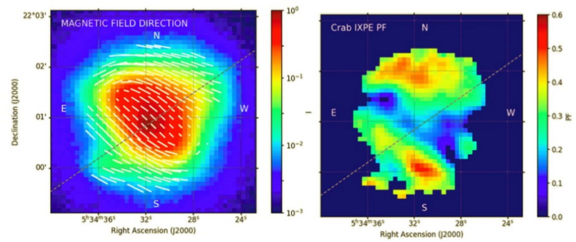


eROSITA: J.Wilms

IXPE is not Chandra but, in combination with Chandra data

The X-Ray Image from Chandra gives the best description of the site of particle acceleration. Polarimetry, even with a poorer angular resolution (25” vs 1”) can give a measurement of the order of the magnetic field.

IXPE has observed the Crab PWN and PSR in February and March for a total live time of the order of 92 ks. (≈1 day).



IXPE: E.Costa

CTA-SKA synergies

- Main areas of synergy with CTA:
  - cosmic rays - eg in supernova remnants
  - astroparticle physics - neutrinos from blazars, dark matter from gamma rays, dark energy and cosmology from matter dipole etc.
  - star formation history - continuum emission in radio and EBL absorption in VHE gamma rays
  - particle acceleration, primarily in blazars but also other extragalactic and galactic jets (GRBs, radio galaxies, binaries, etc.), galaxy clusters, etc.

SKA: M.Giroletti

Galactic topics

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Project motivations

- **Supernova Remnants (SNRs)** considered as **strong candidates** for **birthplaces** of **Cosmic Rays** in **Galactic** environments
- One of the strongest **HE γ-rays** emitters in the **Milky Way** is the **extended SNR W 44**
- **GeV emission** in the remnant **close-by region** reported in previous works (Uchiyama et al. 2012, Peron et al. 2020)
  - Probably due to **escaped CRs**
- Joint **Fermi-MAGIC** project:
  - Detailed morphological and spectral analysis of **W 44 region with Fermi-LAT**
  - **W 44 surroundings** observed with **MAGIC** te...
  - **Hadronic-based** model

W44: R. Di Tria

Expected hadronic γ-ray emission and comparison with data

Comparison with published data

The γ-ray flux depends on f_{CR} which in turns is a function of a large number of parameters (ρ_H=20/cm^3, t_{age}=3Myr, $\dot{M}=10^{-4}\,M_\odot$/yr, η_B=0.1, L_w, s, ε_{CR})

We fix all parameters except L_w, s, ε_{CR} that are varied in order to fit (χ^2 minimization) the observed γ-ray spectrum

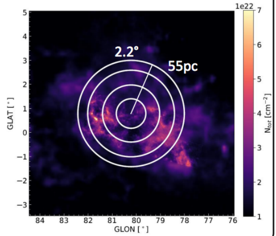
A posteriori we check if the best fit parameters are compatible with "reasonable" values

For the spectrum comparison, we extract the γ-ray flux from a **2.2°** region centered on OB2.
Flux data points from experiments are scaled to account only the flux coming from a region of this size.

We model the ISM around Cyg OB2 as a combination of molecular (H_2) and neutral (HI) hydrogen. Kinematic cuts: -20km/s<v<20km/s
HI and H_2 uniformly distributed along the line of sight in ±400pc

H_2: ^{12}CO(J=1-0) CfA (Dame et al, 2001)
^{12}CO(J=1-0) NRO (Takekoshi et al, 2019)
(using Xco=1.68x10^{20} mol. cm-2 K-1 km-1)

HI: 21cm from CGPS (Taylor et al, 2003)
(using T_{spin}=150°K)



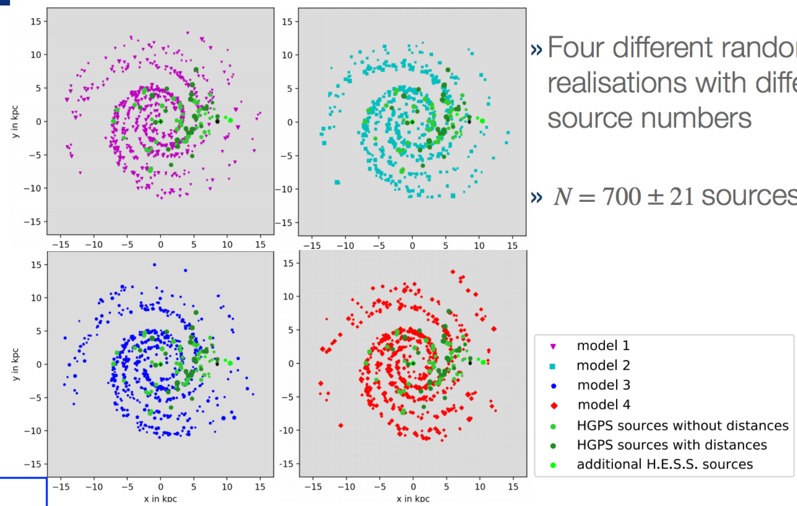
Observation used:

Spectral data points:
- Fermi-LAT (4FGL J2028.6+4110e)
- HAWC (HAWC J2030+409)
- Argo (ARGO J2031+4157)

Radial profile:
- Aharonian et al 2019 (Fermi-LAT)
- Abeysekara et al 2021 (HAWC)

Cygnus OB2: S.Menchiari

Source model construction - Results



» Four different random realisations with different source numbers

» $N = 700 \pm 21$ sources

...niversität ...nsbruck

Julia Thaler | Hands on the extreme universe with high-energy gamma rays | July 22, 2022 | Page 16

CR propagation: J.Thaler

Extragalactic topics

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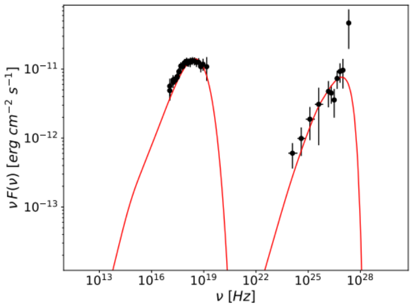
1ES 0229+20

We apply our model to the prototypical extreme TeV blazar, i.e. 1ES 0229+20

- Downstream region radius
  $R = 1.2 \times 10^{16}$ cm
- Alfvén velocity
  $v_a = 2 \times 10^{9}$ cm/s
- Mean magnetic field
  $B = 15.9$ mG
- Non-thermal particles power
  $P'_n = 7 \times 10^{39}$ erg/s
- Turbulence power
  $P'_W = 7 \times 10^{39}$ erg/s



Alberto Sciaccaluga | Extreme TeV Blazar | 20 July 2022 | 7 / 9

Extreme TeV blazars: A.Sciaccaluga

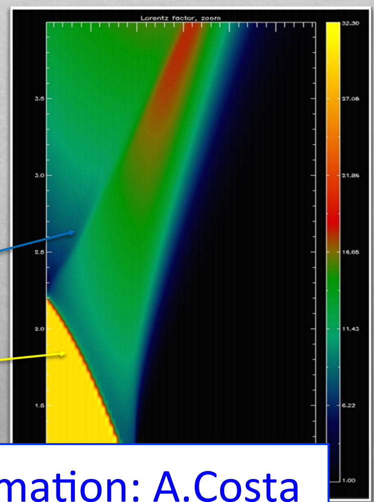
2D simulations with particles for TeV blazars

Setup compatible with TeV blazars

- Relativistic
- Low magnetized and B = $10^{-3}G$
- $p_e = p_{0e}\left(\frac{z}{z_0}\right)^{-1.8}$ and $p_{0j} \ll p_{0e}$ (underpressured)

reflection shock: re-shocked jet

recollimation shock

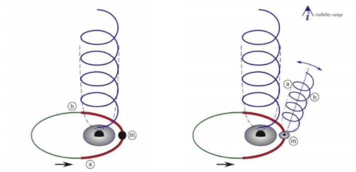


Relativistic jets and recollimation: A.Costa

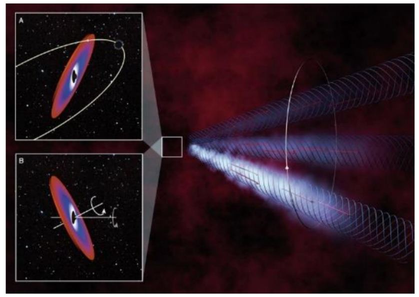
Blazar periodicity

Long-term periodicity could be related to binary black holes [1]:

- Intensity modulation by Doppler factor.
- Precession, deflection or curvature of the jet changing the viewing angle.

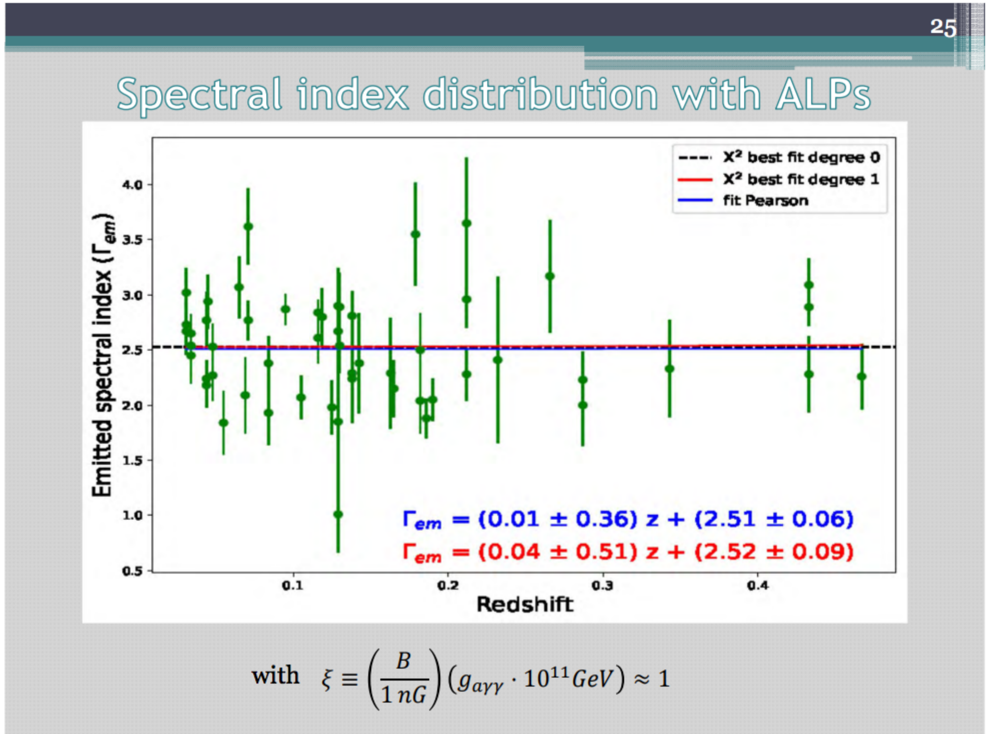


From Tavani et al., 2018 [2]



Blazar periodicity: P. Cristarella Orestano

Fundamental Physics topics

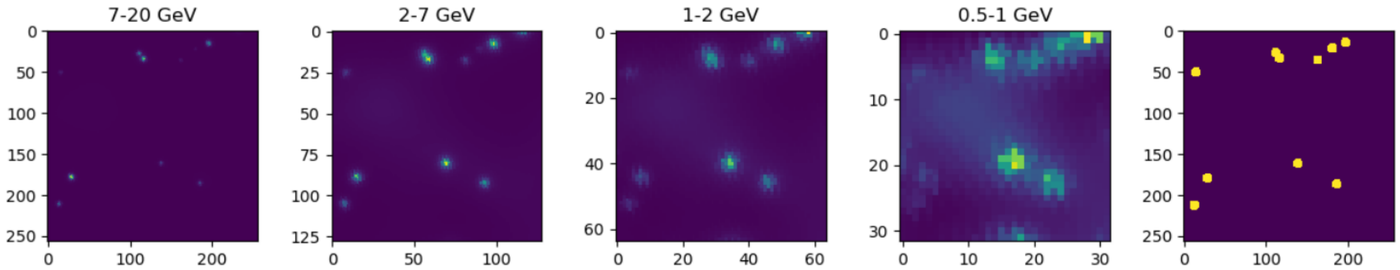


EBL and ALPs: A. Franceschini

Advanced Analysis topics

Training Data & Localization Network

- Images of full sky data in 6 energy bins [0.3 GeV - 1 TeV].



- Step1: Implement U-Net like algorithm. Segmentation task.
  - Each pixel is assigned with a label score (≈1, pixel belongs to region around sources, ≈0, otherwise).
- Step2: Apply K-Means algorithm
  - Group the pixels in a cluster and center of cluster is source location. (Lon, Lat)

Deep Learning: S.Bhattacharyya

- Overview of the program!
  - The Extreme Universe
    - Fermi, current IACTs, LHAASO
  - Next Generation IACT telescopes
    - LST, MST, SCT, ASTRI-SST
  - Theory of VHE sources
    - CR sources, AGN, GRB, PSR-PWN, ALPs
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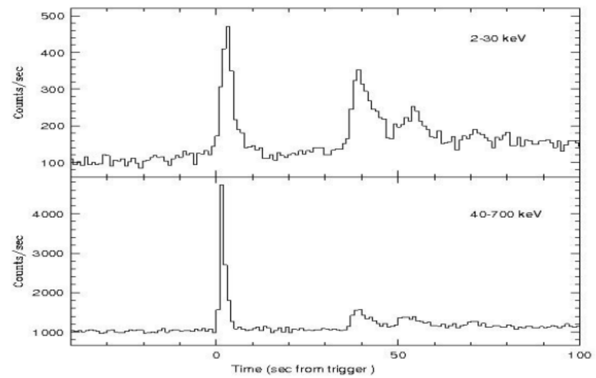
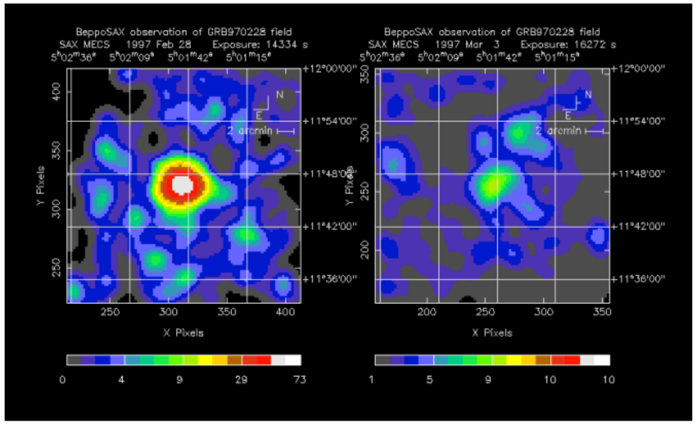
  - Multiwavelength and MultiMessenger connections
    - eROSITA, IXPE, SKA, Neutrinos, GW
  - Special talk – 25 years of GRB afterglows

GRB afterglow discovery

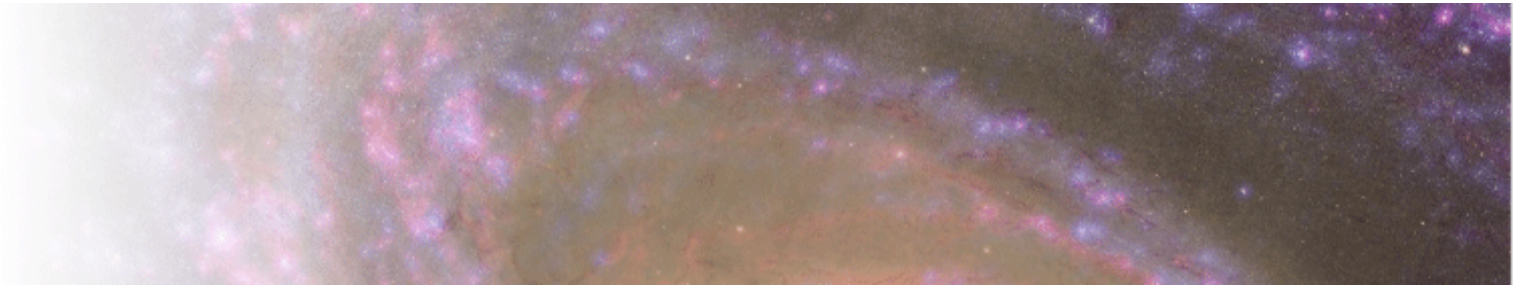
- **Unsuccessful search with the first localized GRB GRB970111.**
- **Second GRB promptly identified and well localized: GRB970228**
- **Follow up after 8 hrs: afterglow emission discovered.**

Costa, Frontera et al. 1997



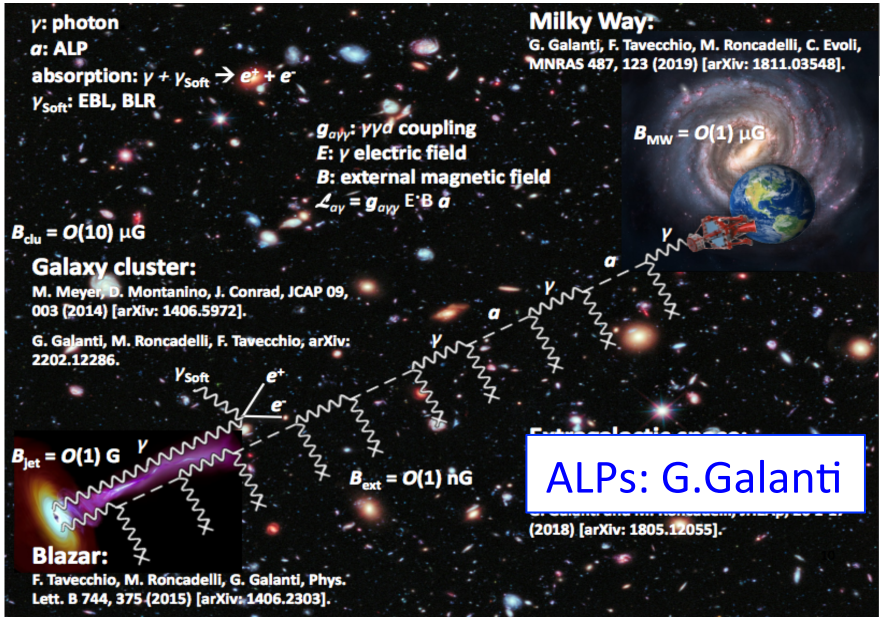


GRB afterglows: E.Costa



- Your overview of the program!
- Build your own …

Polarisation



ALPs: G.Galanti

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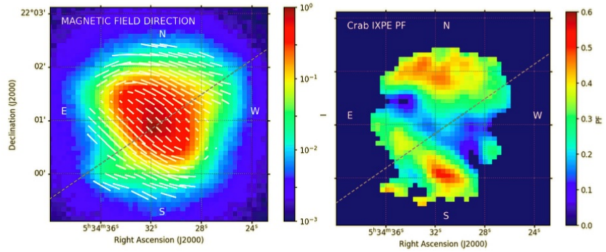
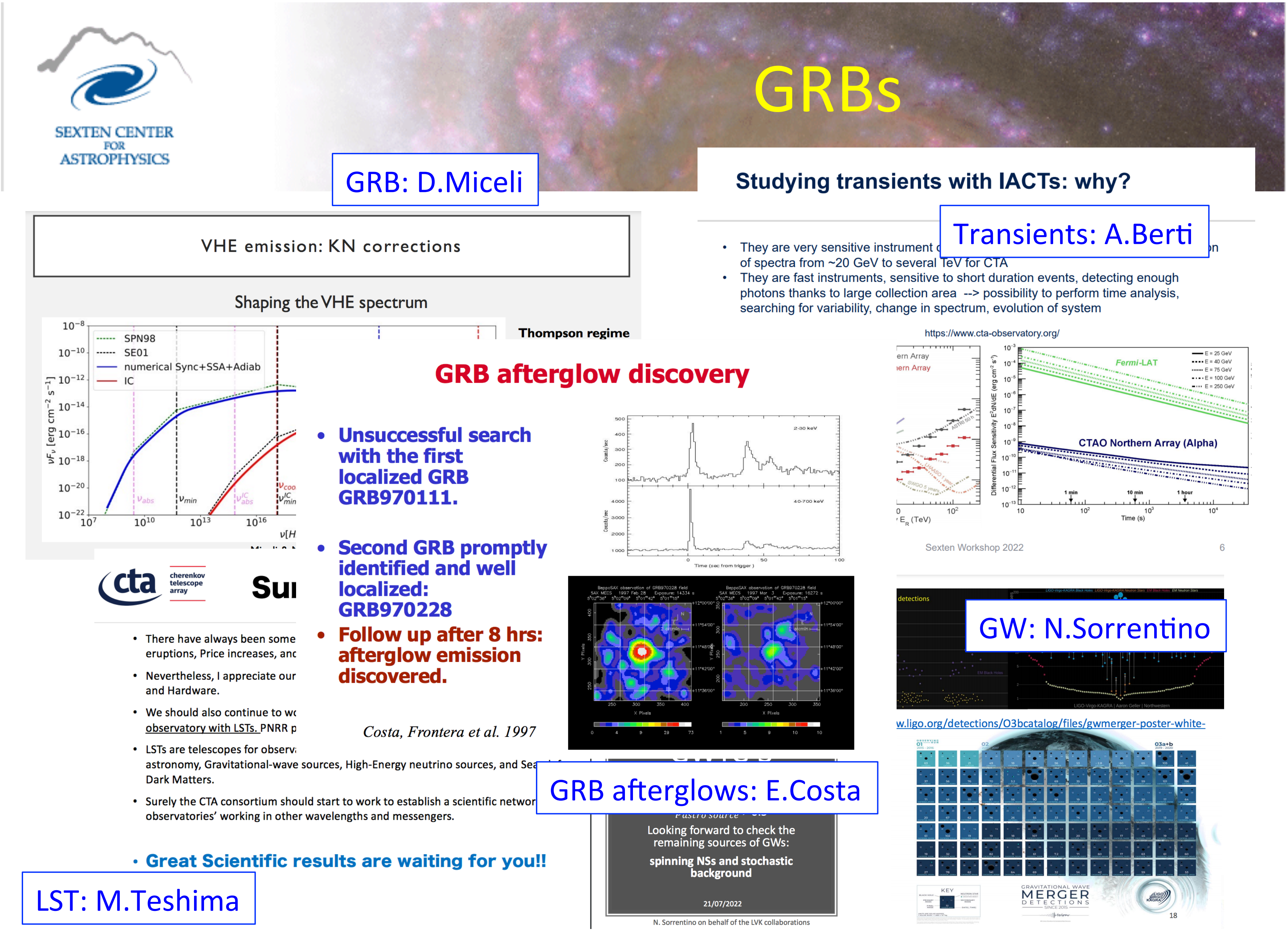
The X-Ray Image from Chandra gives the best description of the site of particle acceleration. Polarimetry, even with a poorer angular resolution (25" vs 1") can give a measurement of the order of the magnetic field.

IXPE has observed the Crab PWN and PSR in February and March for a total live time of the order of 92 ks. (≈1 day).



IXPE: E.Costa


SEXTEN CENTER FOR ASTROPHYSICS
GRBs
GRB: D.Miceli
Studying transients with IACTs: why?
Transients: A.Berti
VHE emission: KN corrections
Shaping the VHE spectrum
Thompson regime
SPN98
SE01
numerical Sync+SSA+Adiab
IC
They are very sensitive instrument
of spectra from ~20 GeV to several TeV for CTA
They are fast instruments, sensitive to short duration events, detecting enough photons thanks to large collection area --> possibility to perform time analysis, searching for variability, change in spectrum, evolution of system
https://www.cta-observatory.org/
Fermi-LAT
CTAO Northern Array (Alpha)
Time (s)
Sexten Workshop 2022
6
GRB afterglow discovery
Unsuccessful search with the first localized GRB GRB970111.
Second GRB promptly identified and well localized: GRB970228
Follow up after 8 hrs: afterglow emission discovered.
Costa, Frontera et al. 1997
cta cherenkov telescope array
There have always been some eruptions, Price increases, and
Nevertheless, I appreciate our and Hardware.
We should also continue to wo observatory with LSTs. PNRR p
LSTs are telescopes for observ astronomy, Gravitational-wave sources, High-Energy neutrino sources, and Sea Dark Matters.
Surely the CTA consortium should start to work to establish a scientific networ observatories' working in other wavelengths and messengers.
Great Scientific results are waiting for you!!
LST: M.Teshima
GRB afterglows: E.Costa
Looking forward to check the remaining sources of GWs:
spinning NSs and stochastic background
21/07/2022
N. Sorrentino on behalf of the LVK collaborations
GW: N.Sorrentino
detections
w.ligo.org/detections/O3bcatalog/files/gwmerger-poster-white-
GRAVITATIONAL WAVE MERGER DETECTIONS
18

Pevatrons

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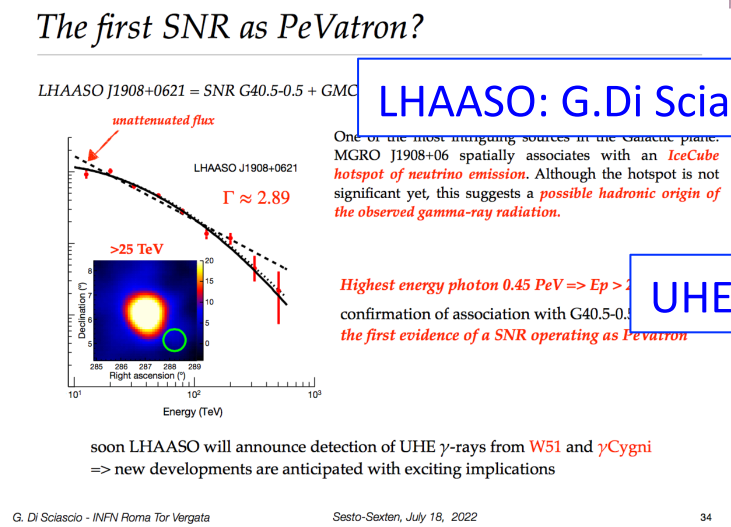
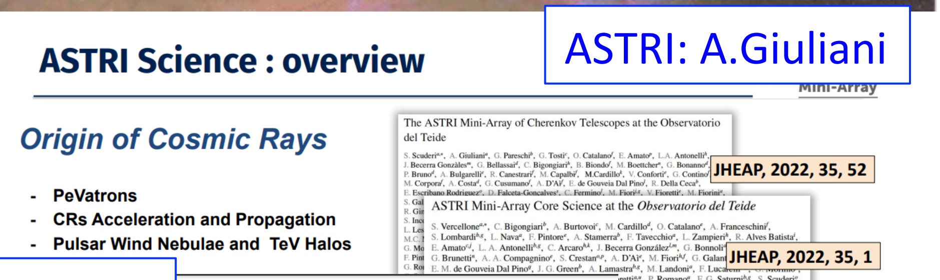
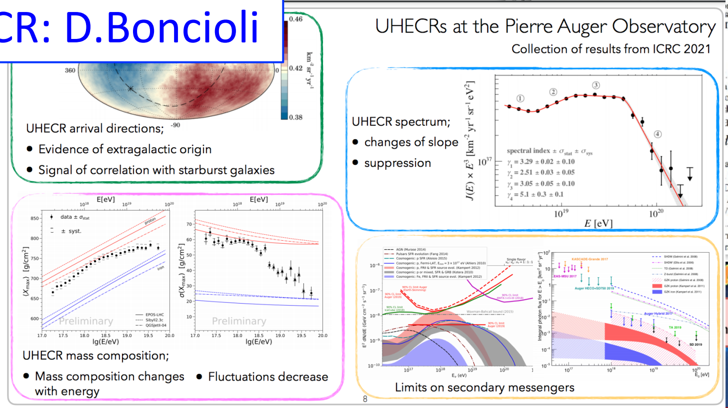
LHAASO: G.Di Sciascio



ASTRI: A.Giuliani



UHECR: D.Boncioli

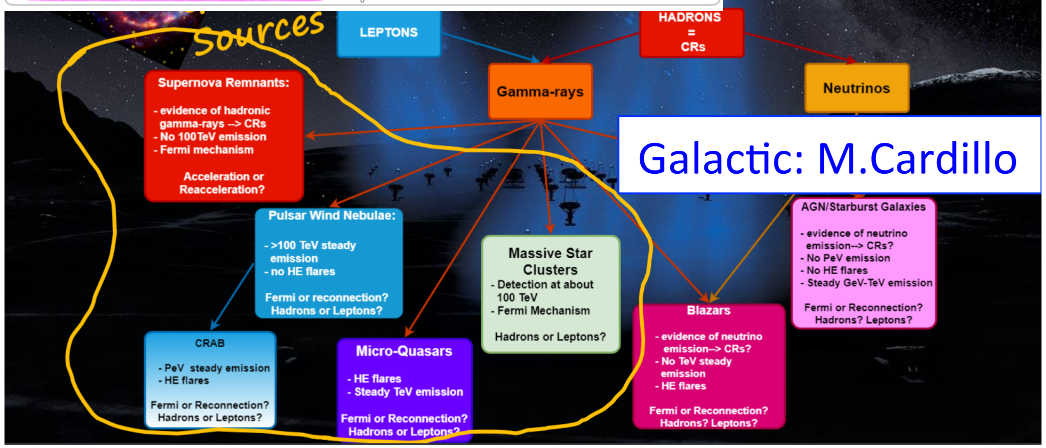


Pevatrons: G.Morlino

Object-oriented strategy

- If PeVatrons are SNRs (at age $\lesssim$ tens of ys as suggested by theory)
  - Look for emission from close-by clouds illuminated by escaping PeV particles
  - Look for young SNe in close-by galaxies to check for TeV-PeV emission
- Stellar Clusters
  - Very extended sources: require deep observations
- PWNe
  - High spatial resolution + high energy resolution
  - Hadronic contribution: combined analysis with ASTRI, LHAASO (or SWGO) only for powerful pulsars
- Giant magnetic islands
  - the most difficult case to detect: probably only diffuse emission will be detected
- Super-PeVatrons
  - Search of synchrotron emission due to secondaries with LSTs (in possible synergy with Fermi-LAT) [F. Aharonian suggestion]
- For PeVatron candidates High Night sky background deep observations can be done: they do not subtract observation time from other KSPs)
- Overlap with other KSPs: GC and Star-forming regions

Galactic: M.Cardillo



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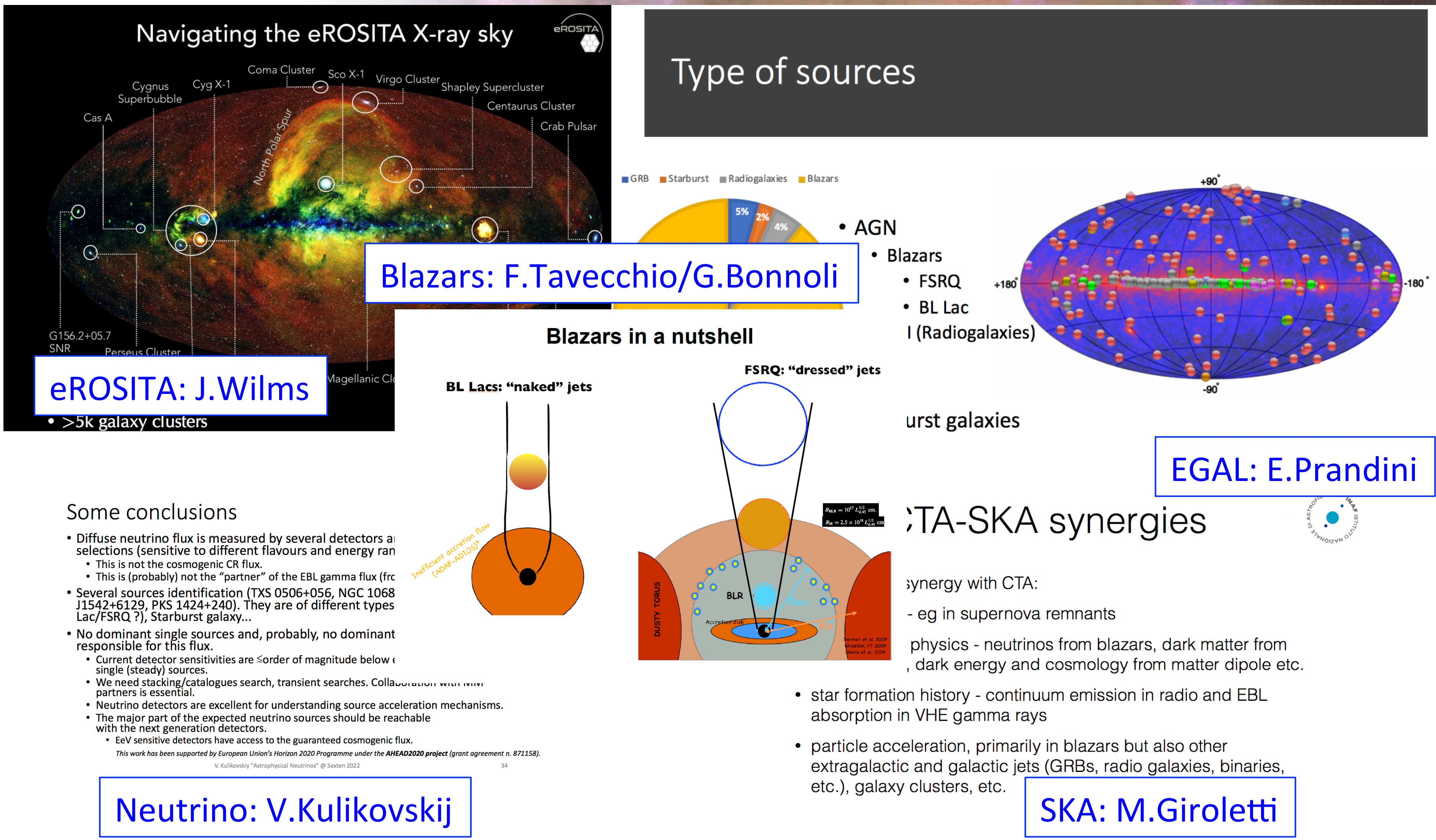
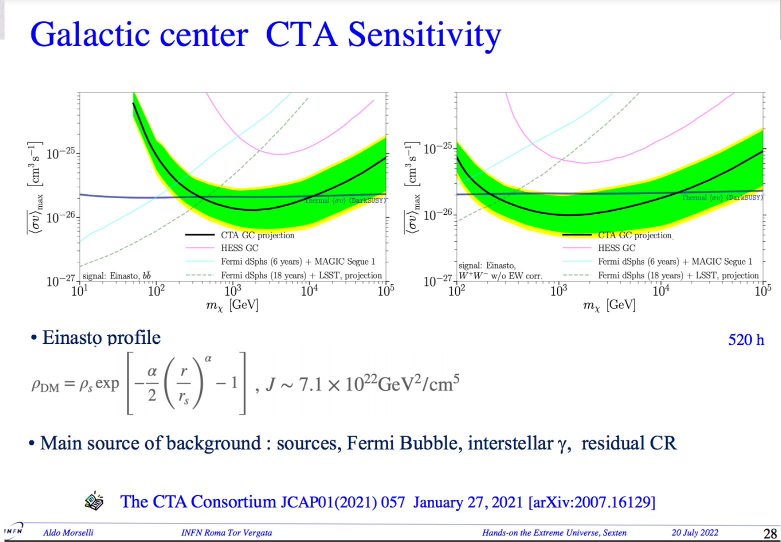
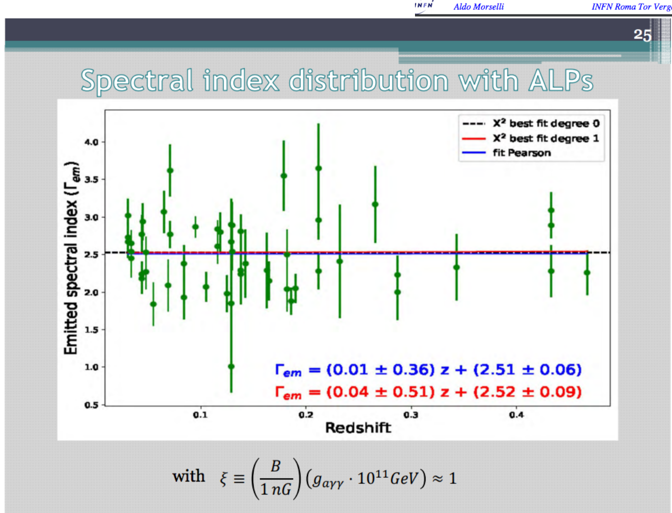
Extragalactic topics



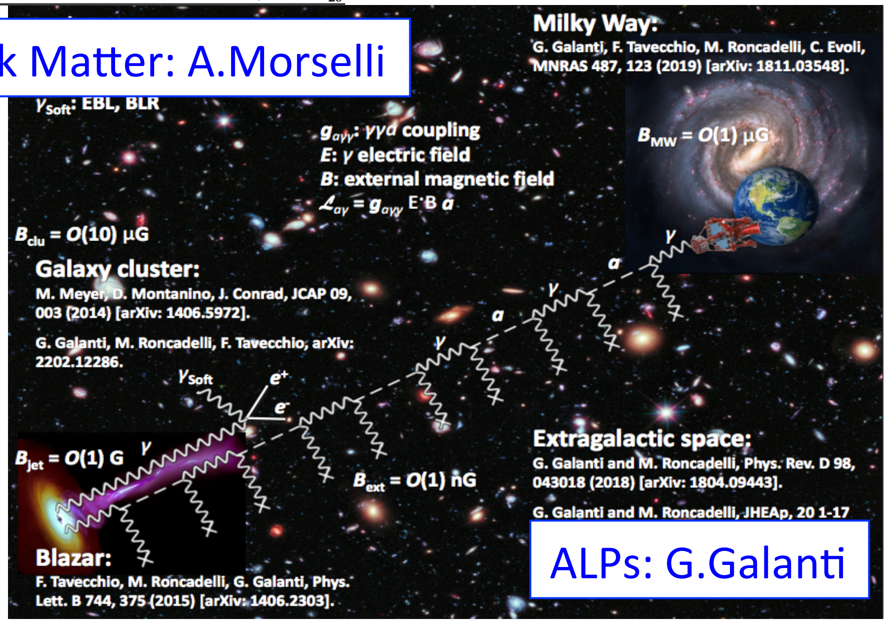
Fundamental Physics



Dark Matter: A.Morselli



EBL and ALPs: A. Franceschini



ALPs: G.Galanti

VHE and Optics

Conclusion and « take home messages »

MST: J-F. Glicenstein

- The instrumental requirements on MST structures and cameras follow from the
- physics requirements of CTA.

- The MST telescopes use a common mechanical Davies-Cotton and 2 cameras designs: NectarCAM (CTAN) and FlashCam (CTAS).

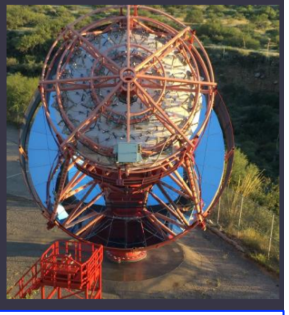
- A prototype of Davies-Cotton structure has been implemented near Berlin in 2012 and extensively tested.
- NectarCAM and FlashCam fulfill all CTA requirements and have comparable performances.
- The FlashCam camera uses off-the-shelf component with a photon detection plane and electronics racks. It had its first light in 2017. A FlashCam is succesfully operated since October 2019 on the CT5 telescope of H.E.S.S.
- The NectarCAM camera has a modular structure based on the Nectar ASIC. It has its first light in 2019.

- The installation will follow the « pathfinder » strategy before acceptance of telescopes by CTA.
- The first telescopes should be installed on CTAN and CTAS in 2023-2024.

MST-Sexten 07/22 33

SCT Summary and Outlook

- **Recent results**
  - Improved optics alignment
  - First measurement of inclination-dependent PSF measurement
  - Further work on current camera to improve data analysis
  - Full-chain (FPM+SMART+FEE) measurements for camera upgrades
    - Production for full camera started
- **Next steps**
  - Continued commissioning, engineering, and operations
  - Improvements in Optical System (alignments and off-axis PSF)
  - Camera upgrade
    - Production and installation of upgraded sensors and electronics
  - Discussions with CTAO Project Office
    - Infrastucture planning and budgeting for SCT addition in CTA-S



E. Bissaldi Sexten School for Astrophysics • 18 July 2022

SCT: E.Bissaldi

The ASTRI Mini-Array Project

Mini-Array

June 2022
- **Phase 0**
  - 1 Telescope Structure
  - m-ICT

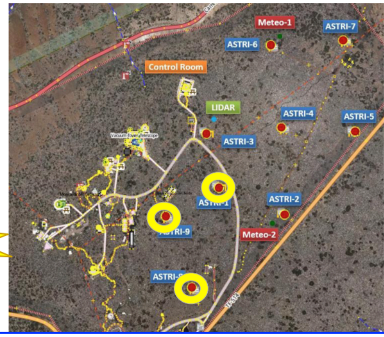
Autumn 2022
- **Phase 1**
  - 3 Telescope Structures

Late Spring 2023
- **Phase 2**
  - 3 Telescope Structures + Cameras

Early observations

Autumn 2023
- **Phase 3**
  - Full Array

End of 2024



Giorgia Sironi – *Hands on the extre*

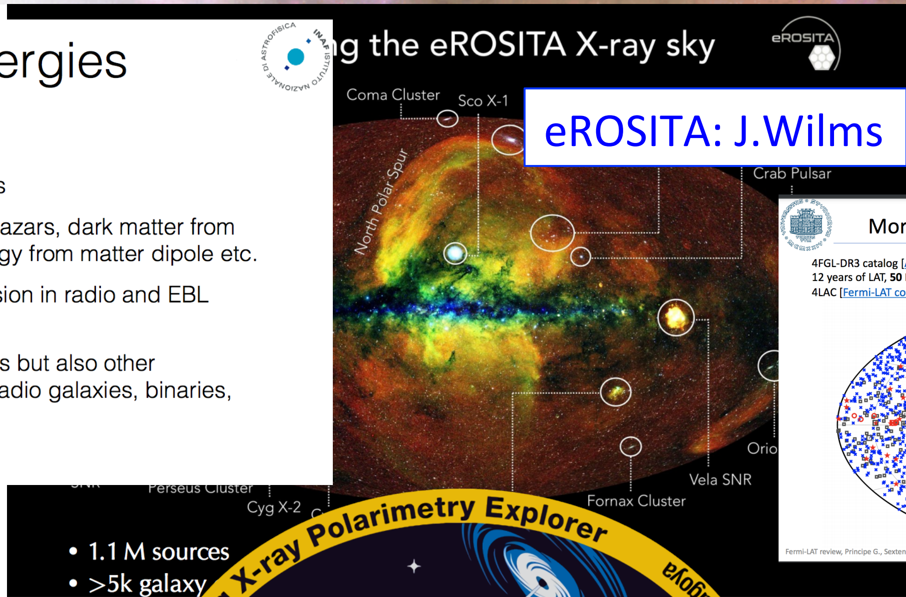
ASTRI & SST: G.Sironi

Multiwavelength

CTA-SKA synergies

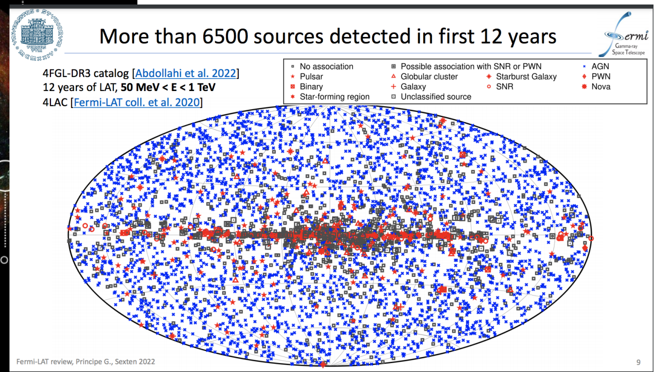
- Main areas of synergy with CTA:
  - cosmic rays - eg in supernova remnants
  - astroparticle physics - neutrinos from blazars, dark matter from gamma rays, dark energy and cosmology from matter dipole etc.
  - star formation history - continuum emission in radio and EBL absorption in VHE gamma rays
  - particle acceleration, primarily in blazars but also other extragalactic and galactic jets (GRBs, radio galaxies, binaries, etc.), galaxy clusters, etc.

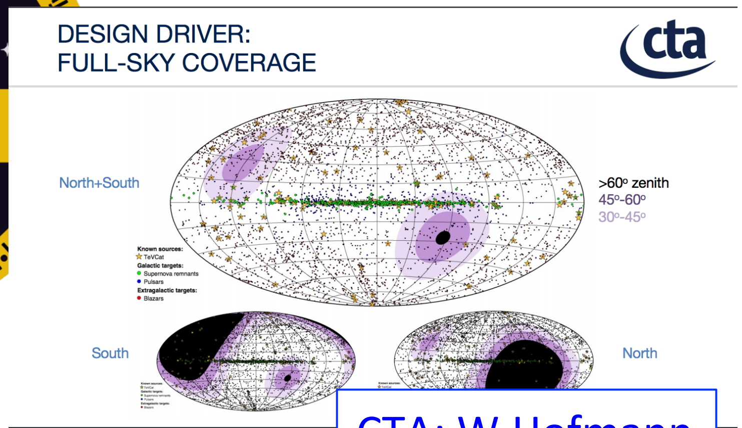
SKA: M.Giroletti



eROSITA: J.Wilms

Fermi: G.Principe





Optical:?

IXPE: E.Costa

CTA: W.Hofmann

Multiwavelength

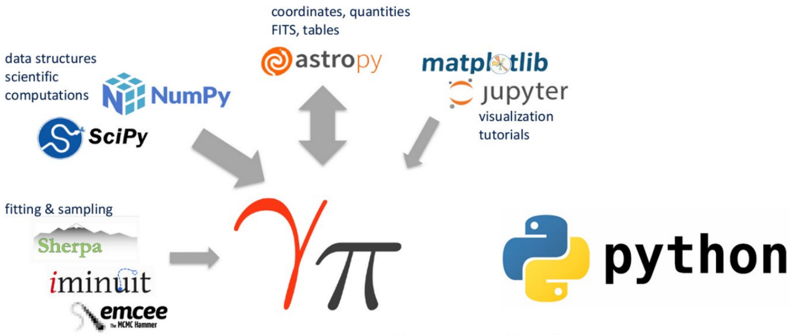
Optical: C.Righi, G.Bonnoli, I.Burelli, D.Miceli et al.

- Hands On
  - High Level Analysis for CTAO and ASTRI
    - Gammapy
    - Participants reports on HandsOn – Friday

- Tutorials
  - The Communication as a bridge between Science and Society
  - From Science to Society: a fruitful path

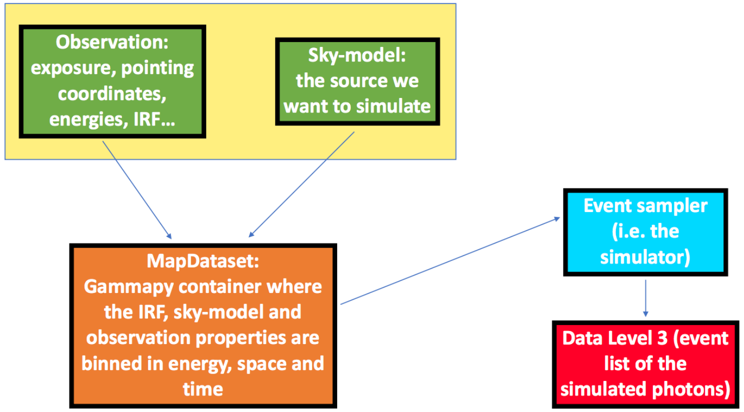
Gammapy: F.Pintore, G.Rodriguez, G.Principe, A.Giuliani, M.Cardillo

Introduction to Gammapy



v0.20 released on May 12th

Simulations with Gammapy



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Outlook

All the people involved (CTAC and CTAO) are actively working on the preparation of the first CTAO SDC!

- Start of the execution of the **SDC** expected in **mid 2023**.
- The idea is to deliver the SDC simulations in bunches (most likely of 1 year each) with a given cadence (e.g. every month)
- **Winners' nominations: Jan 2024!!**

Thank you very much for your attention!

CTAO Data Challenge: F. Pintore

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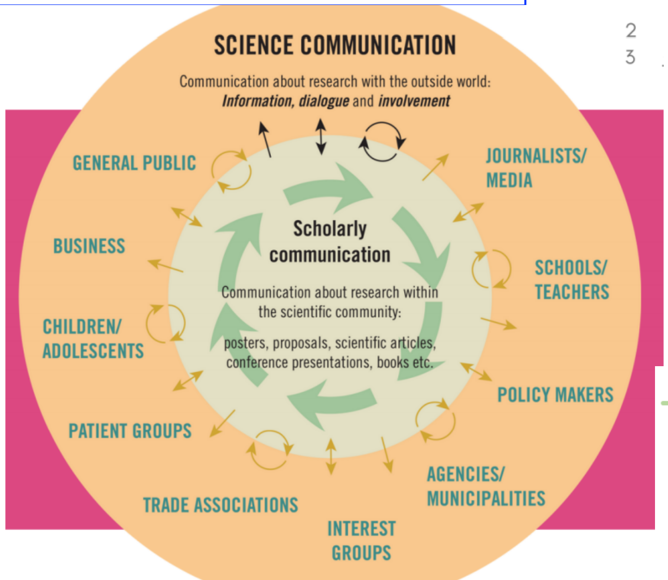
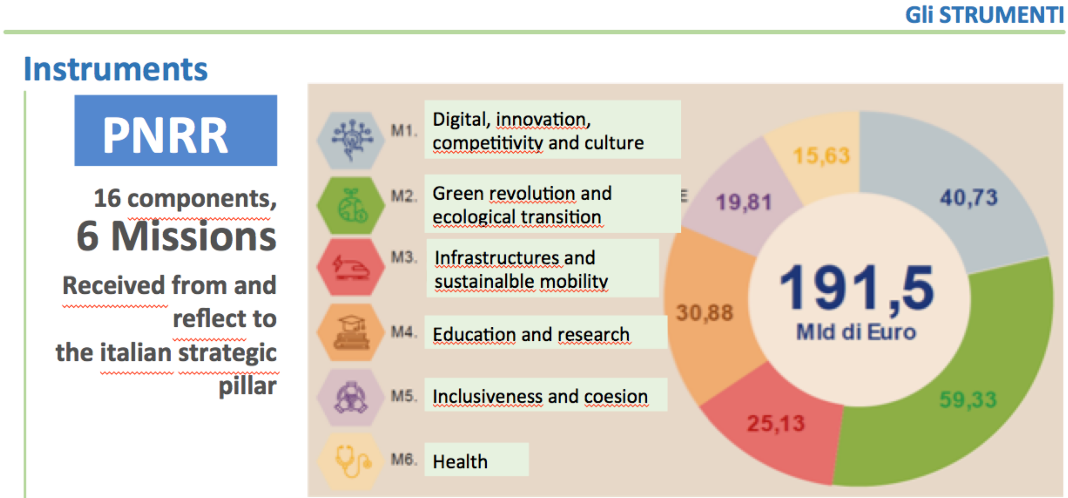
Tutorials

Science Communication: R.Spiga





Interaction with private sector F.Giordano

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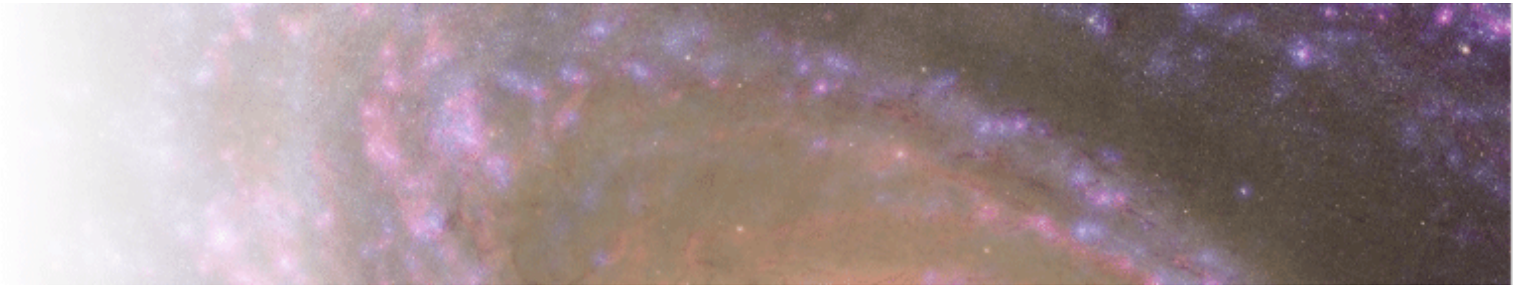

- A wonderful conference !

Hands-on the Extreme Universe with High Energy Gamma-ray data

18 Jul 2022, 10:00 → 22 Jul 2022, 14:00 Europe/Rome

Sexten

ABSTRACT_BOOKL... | Zoom Link | Zoom SextenWorks...

Monday, 18 July

10:00 → 13:00 **The Extreme Universe**

10:00 **The Fermi view of the High Energy sky** — 30m

Speaker: Giacomo Principe (Istituto Nazionale di Fisica Nucleare)

Review_Fermi_LAT_...

10:30 **From the current IACT to CTA** — 30m

Speaker: Werner Hofmann

2022_07_Sexten_CT...

The indico page will be sent you soon

- A wonderful group !

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- See you at Sexten 2024!