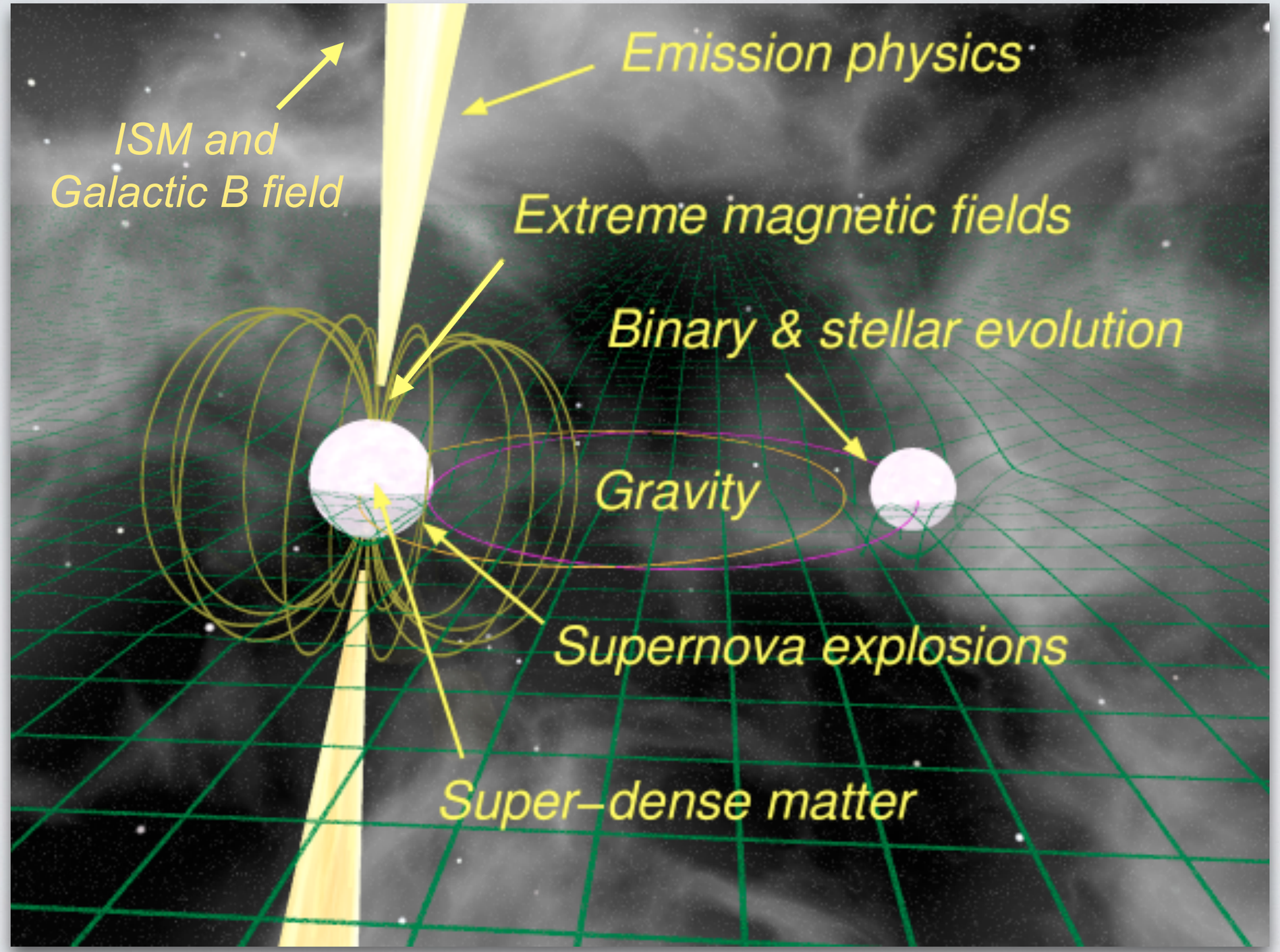
PULSARS WITH SKA

SWG activity overview & italian involvement

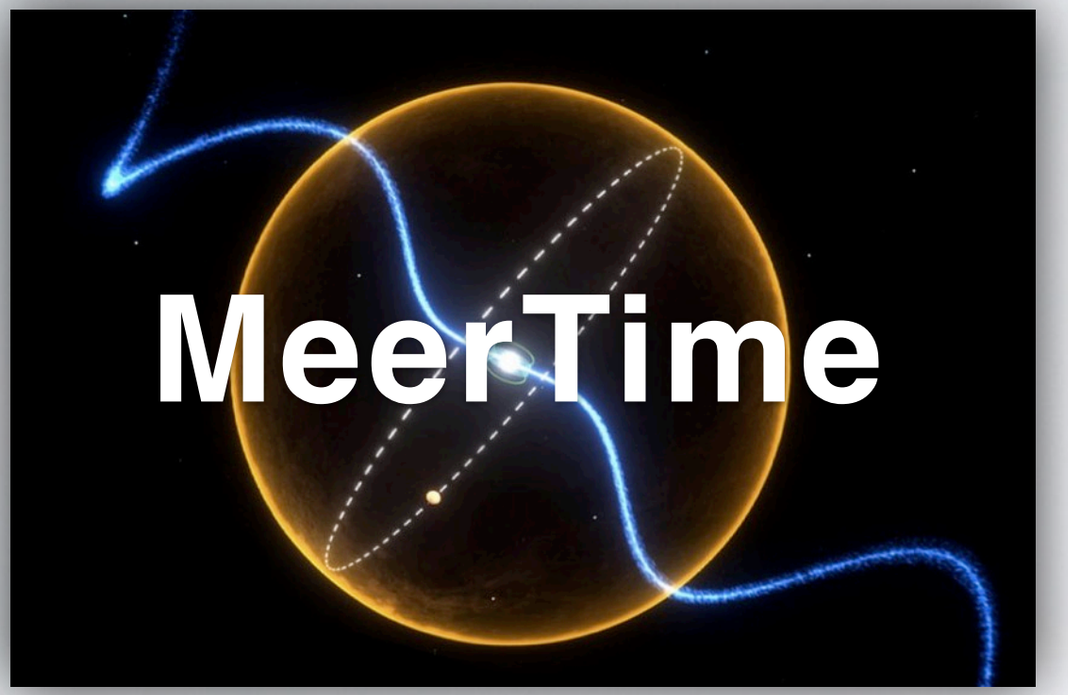
Marta Burgay - INAF Osservatorio Astronomico di Cagliari - Pulsar SWG Co-Chair

The scientific impact of Pulsars



Stappers 2015

PULSAR WITH MEERKAT



Timing

1. Relativistic and Binary Pulsars
2. PTA for GW detection
3. Globular Cluster Pulsars
4. The 1000 Pulsar Array

TRAPUM

Transients and **Pu**lsars with **M**eerKAT

Searching

1. SNRs,PWNe,TeV
2. Fermi un-ID sources
3. Globular Clusters
4. Nearby Galaxies
5. Transients (fly's eye+repeaters)

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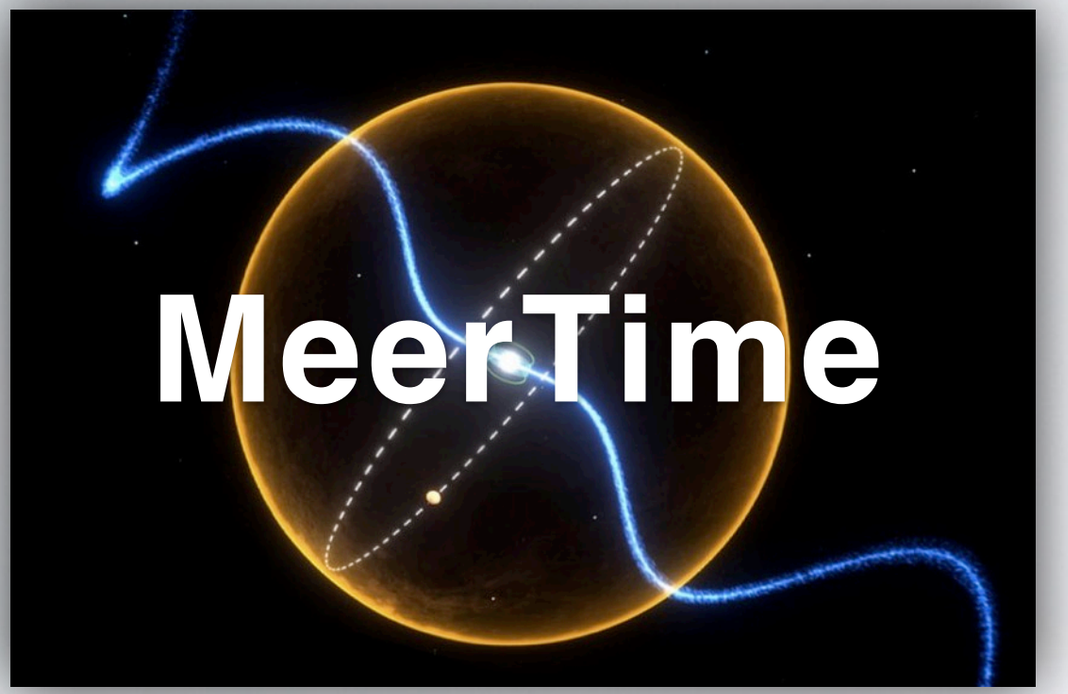

WG chair

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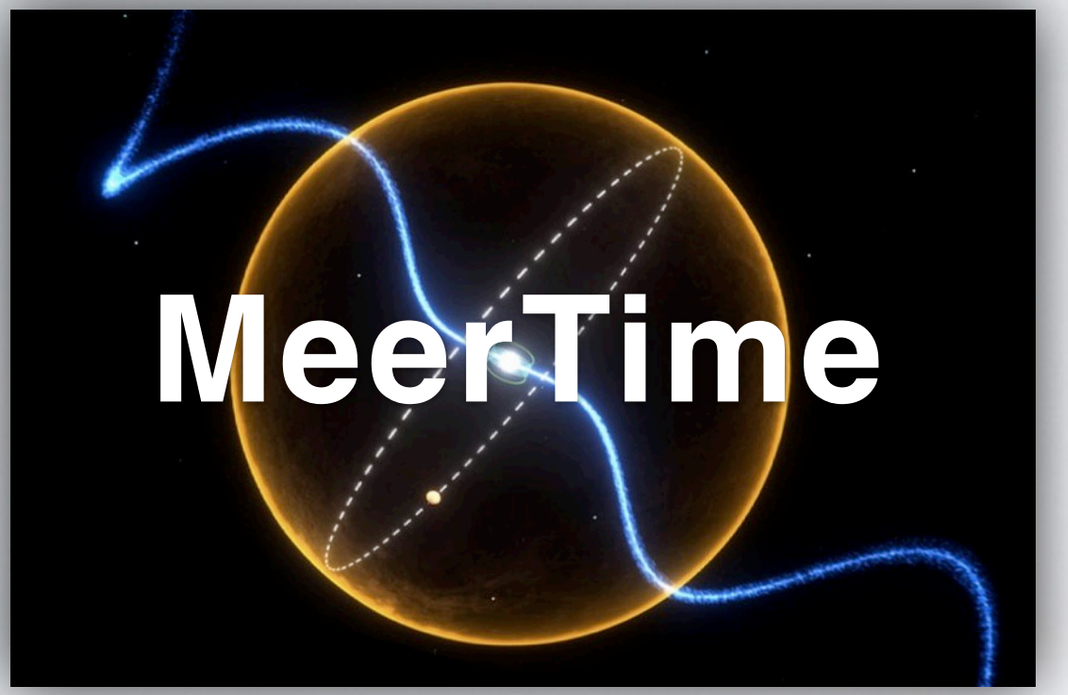

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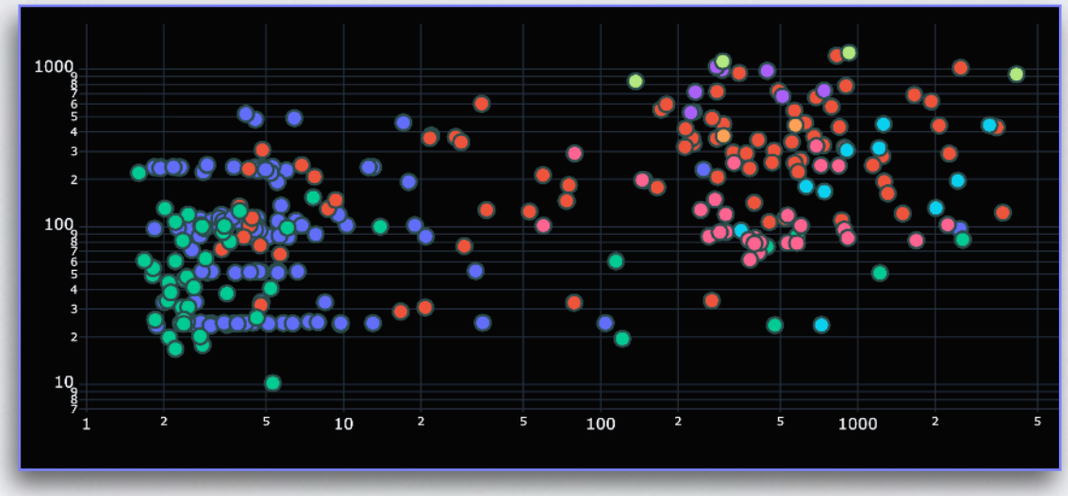
Funds through PRIN SKA-CTA 2021 & Large Grant 2022

MeerKat LSPs results

300 discoveries

90 papers



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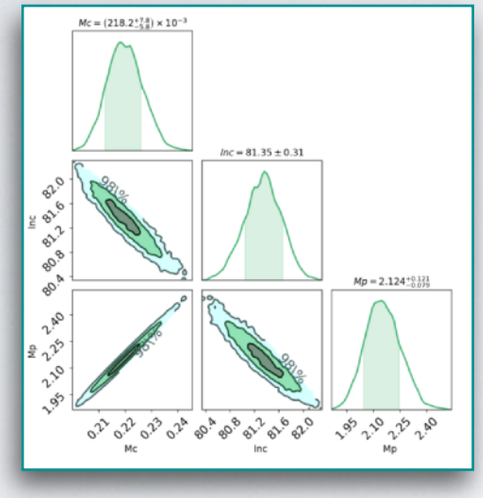
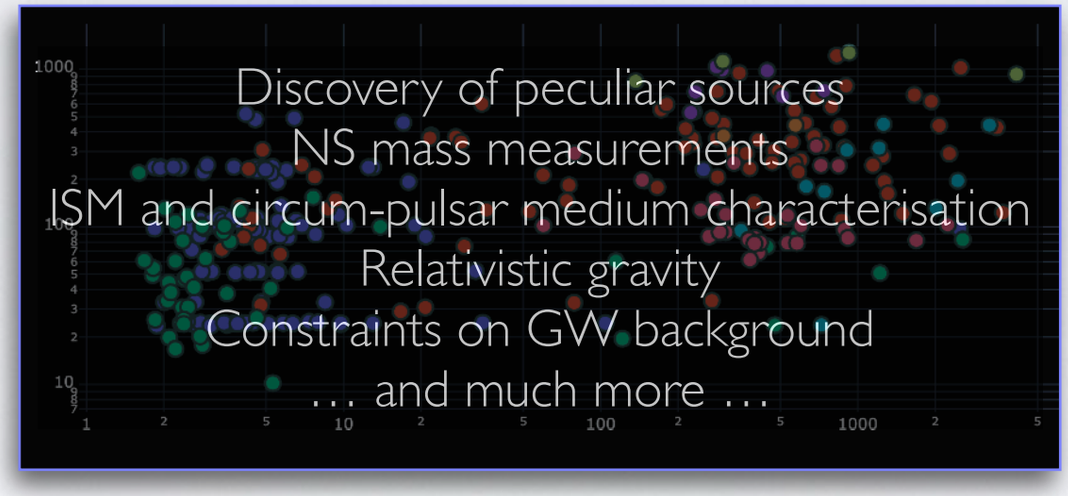
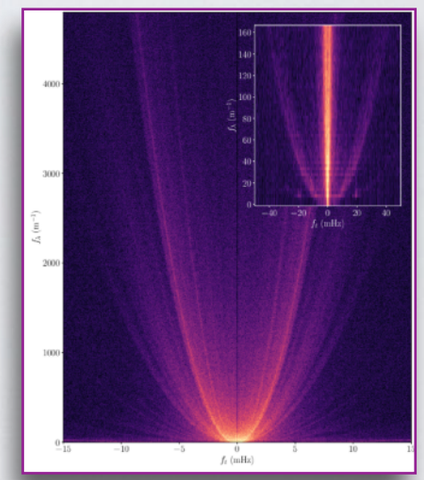
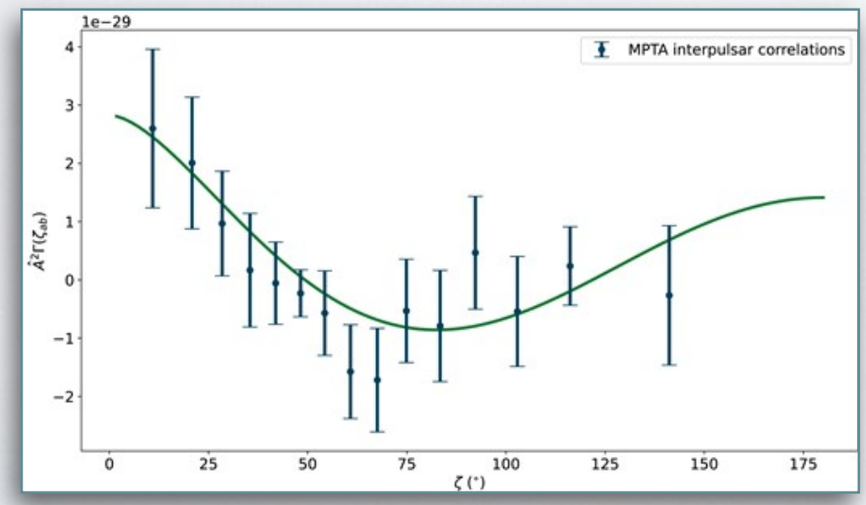
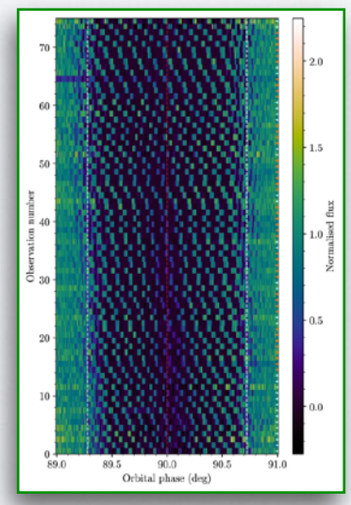




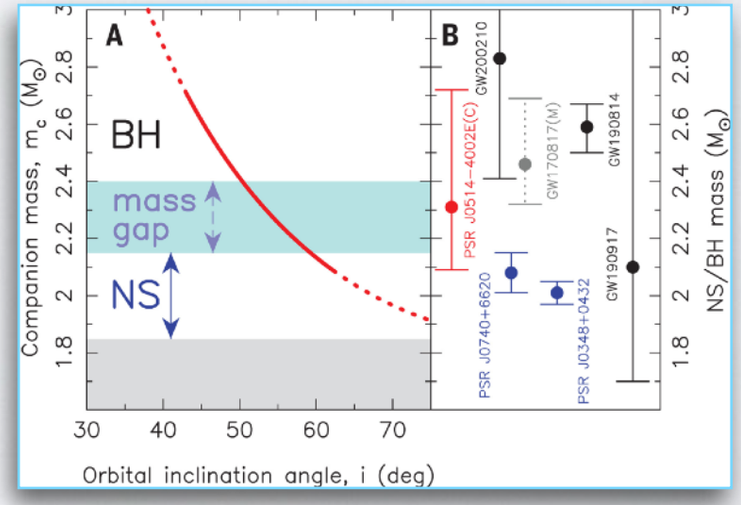




MPTA GWB limit - Miles et al 2024



Lower et al 2024



GCs - Barr et al. 2024, Science

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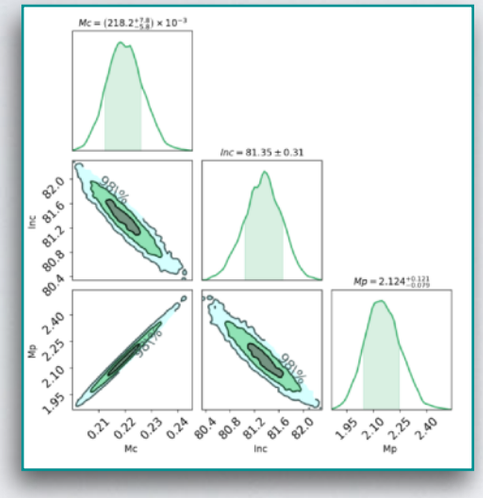

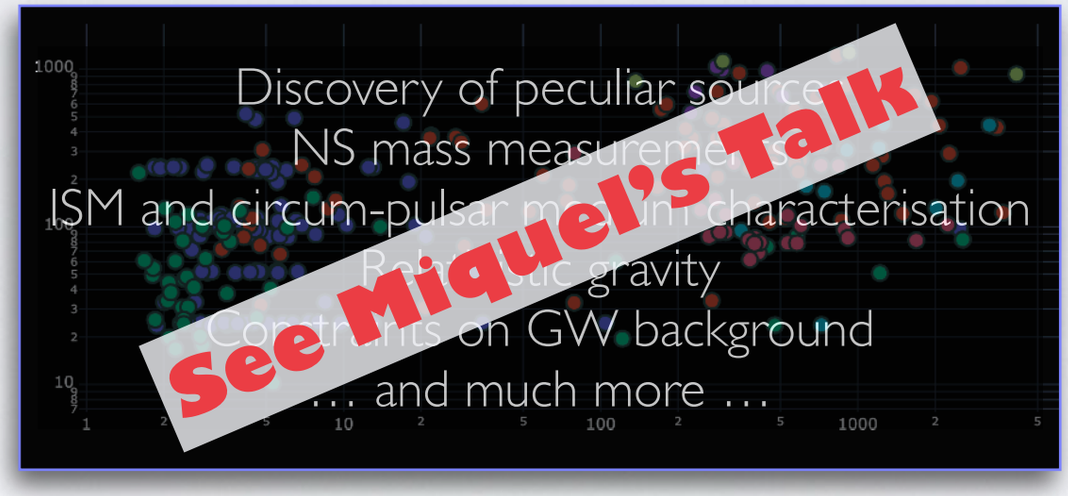

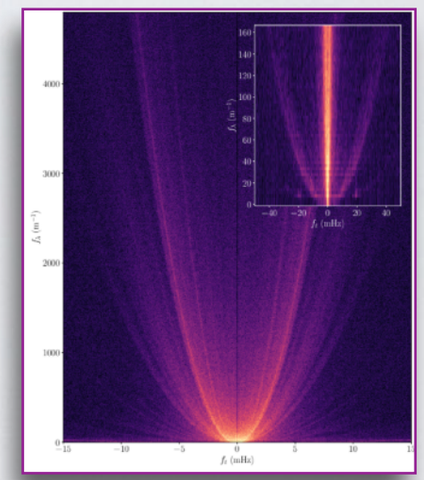

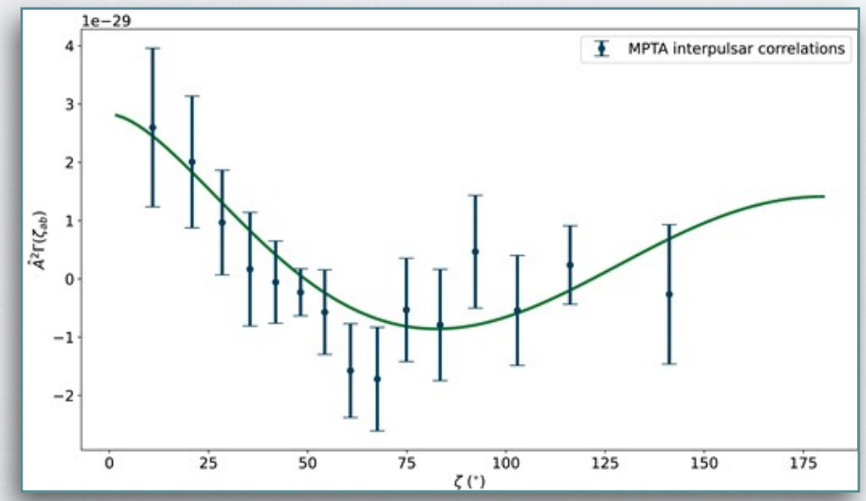

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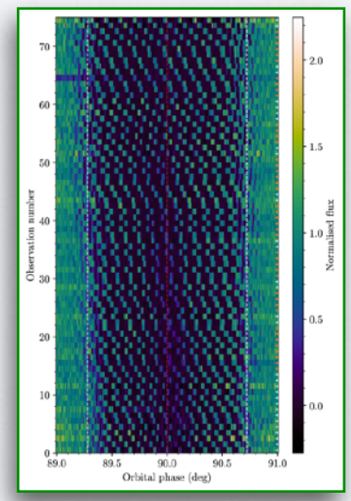

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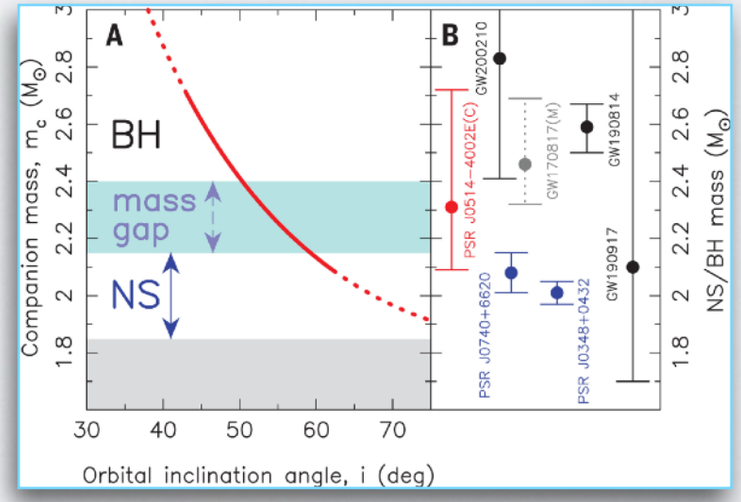

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PULSARS WITH LOFAR

- **Major Italian involvement and leadership in monitoring observations** since 2013
  - **Weekly** cadence observations until 2024 with LOFAR core + international stations
  - **Daily** observations with german single stations through a program built by C. Tiburzi involving all interested parties in the pulsar community
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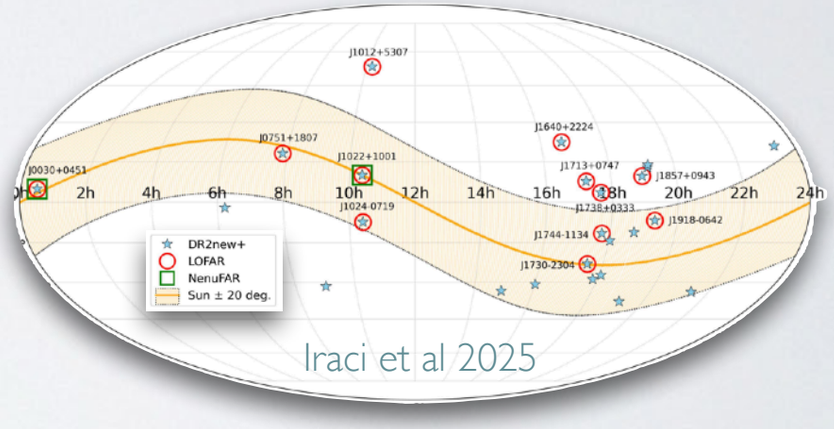

Iraci et al 2025

- **Main science topics:**
  - Plasma studies for PTAs - Galactic structure - Pulsar emission - Eclipsing pulsars
- **Main results**
  - Impacts of the Solar wind (Tiburzi+2019, Tiburzi+2021, Tiburzi+2022, Shaifullah+2022, Nitu+2024, Susarla+2024)
  - Impacts of the IISM turbulence (Donner+2019, Donner+2021)
  - **Milestone** paper integrating the LOFAR/NenuFAR data in the EPTA dataset (Iraci et al 2025)

PULSARS WITH LOFAR 2.0



Searching

- Pulsar & Fast Transient Surveys
- Pulsar emission mechanism
- NS equation of state
- Relativistic gravity
- Pulsar properties at low-frequencies
- FRB progenitors
- FRBs as probes of the IGM, halo and ISM
- Galactic fast transients
- Exploring the transients parameter space:

Timing

- PURR: Pulsar & FRB Follow-up
- Pulsar Timing Arrays
- ISM & Galactic structures
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PULSARS WITH LOFAR 2.0

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7 italian Co-Is

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INAF PI 11 italian Co-Is

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SKA Book - Pulsar Chapters

Advancing Astrophysics with the SKA II

Lina	Levin Preston	Understanding the Neutron Star Population with the SKAO telescopes
Caterina	Tiburzi	Exploring the Galactic plasma with pulsars in the SKAEra
Manjari	Bagchi	Pulsars in Globular Clusters With the SKAO
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129 active authors (250 in SWG) from **20** countries

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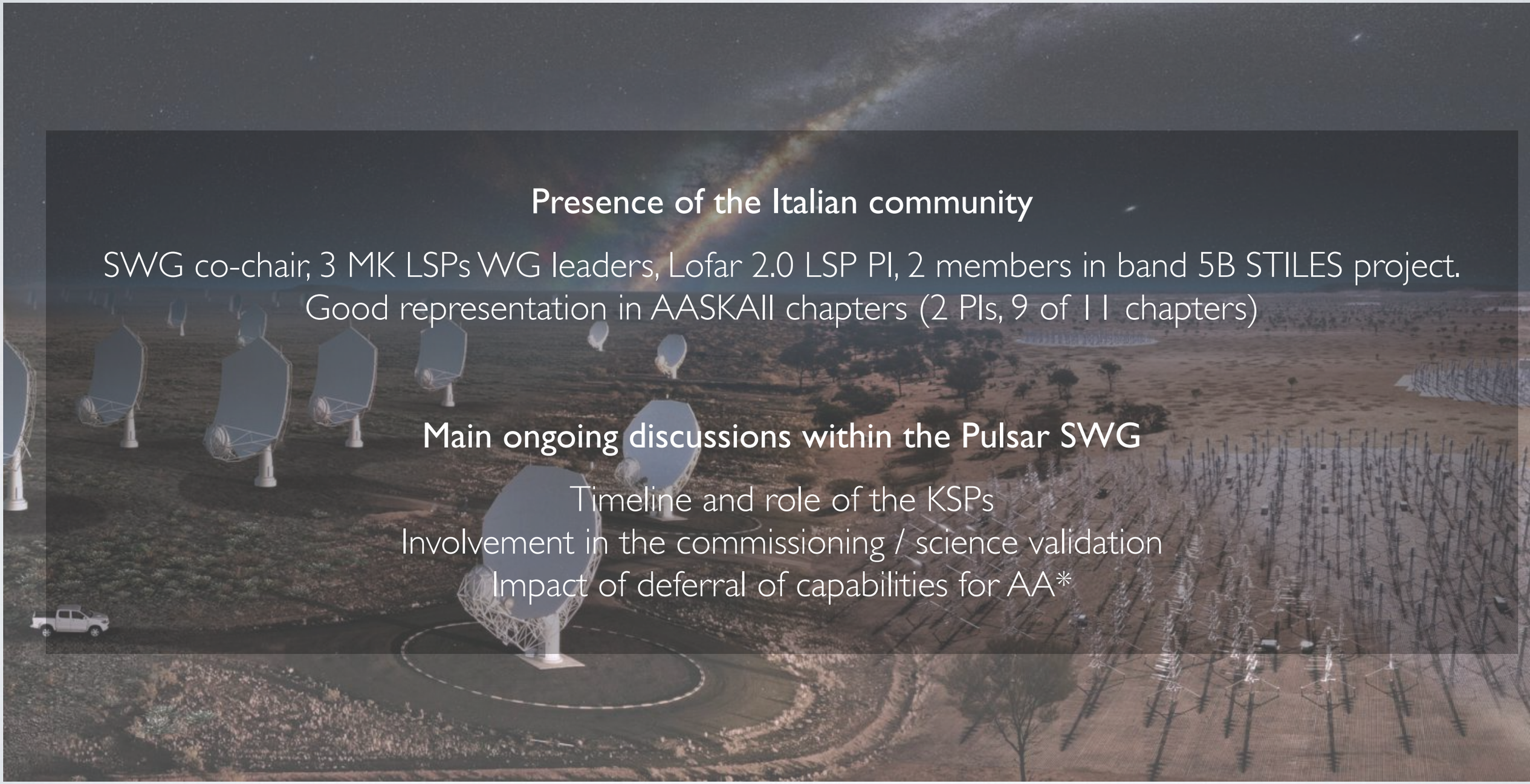
TOWARDS THE SKA



Presence of the Italian community

SWG co-chair, 3 MK LSPs WG leaders, Lofar 2.0 LSP PI, 2 members in band 5B STILES project.
Good representation in AASKAII chapters (2 PIs, 9 of 11 chapters)

Main ongoing discussions within the Pulsar SWG

Timeline and role of the KSPs
Involvement in the commissioning / science validation
Impact of deferral of capabilities for AA*

Thank you