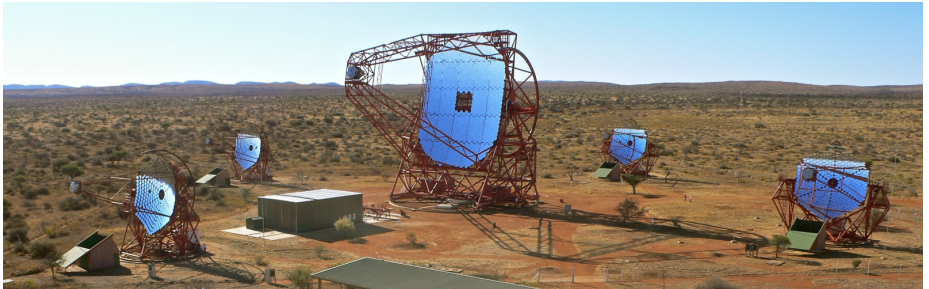


# Observation of burst activity from SGR1935+2154 associated to first galactic FRB with H.E.S.S.



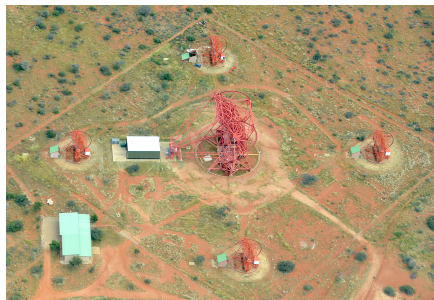
D. Kostunin, H. Ashkar, F. Schüssler, G. Rowell  
for the H.E.S.S. collaboration

ICRC2021

# High Energy Stereoscopic System

Namibia, 23°16'17"S 16°30'00"E, 1800 m a.s.l.

- Energy range 30 GeV – 100 TeV
- Energy resolution  $\sim 15\%$
- Angular resolution  $\sim 5'$
- Source position  $\sim 10''$
- Observations  $\sim 1000$  h/year



## H.E.S.S. phase I (Sep. 2002)

- 4 telescopes:  $\varnothing 12$  m, 107 m<sup>2</sup>
- Stereoscopic reconstruction
- 960 PMTs/camera, FoV 5°

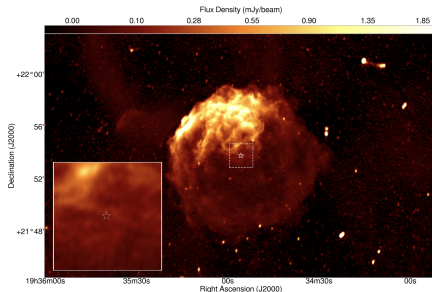
## H.E.S.S. phase II (Sep. 2012)

- 5th telescope:  $\varnothing 28$  m, 600 m<sup>2</sup> (largest IACT in the world)
- 2048 (until Oct. 2019) / 1758 (now) PMTs, FoV 3.5°
- Energy threshold  $\sim 30$  GeV
- Fast response of CT5:  $>90\%$  of targets in 60 s

# SGR and FRB

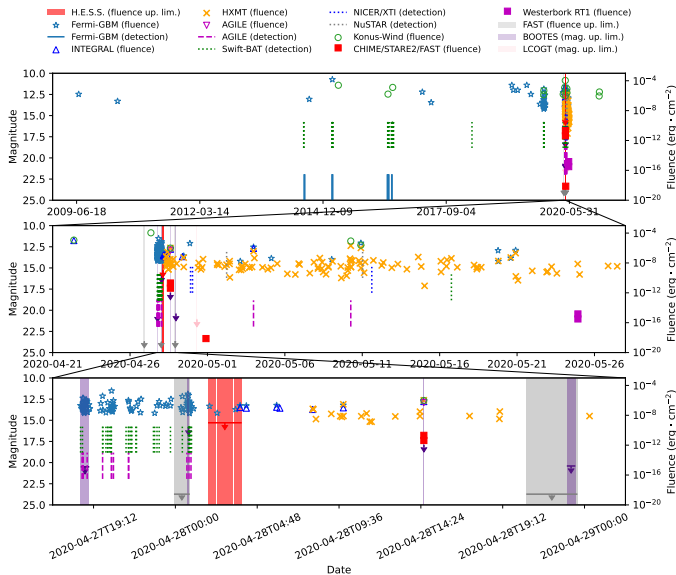
Soft Gamma-ray Repeaters (**SGR**) and Anomalous X-ray Pulsars (**AXPs**) are associated with highly magnetized neutron stars or magnetars.

Fast radio bursts (**FRBs**) are powerful radio pulses with a duration of several milliseconds with high brightness temperatures suggesting a coherent emission mechanism



M. Bailes et al. Multi-frequency observations of SGR J1935+2154 Mon.Not.Roy.Astron.Soc. 503 (2021) 4, 5367-5384m

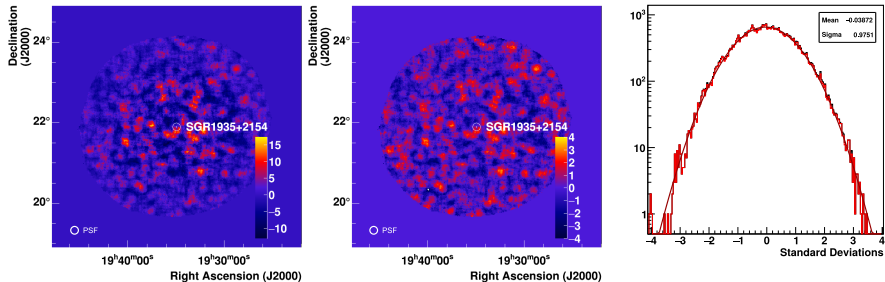
# MWL observations of SGR1935+2154



# H.E.S.S. observations of SGR1935+2154

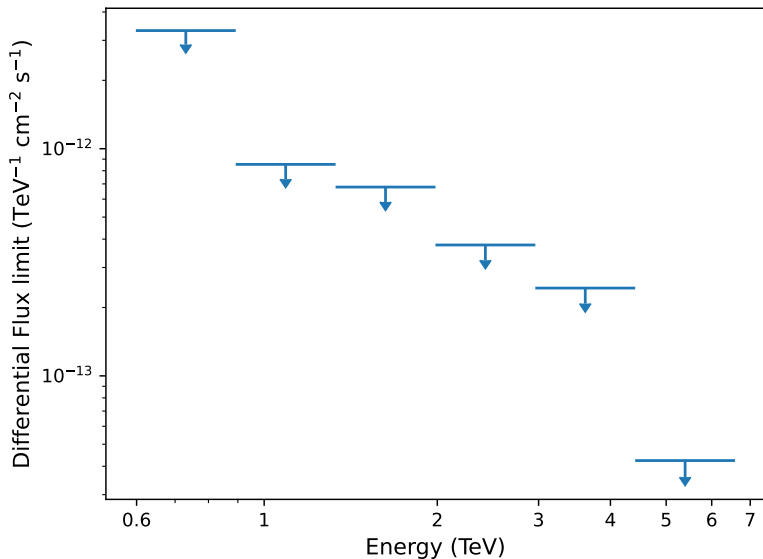
Start time (UTC)	Duration	Average zenith angle
2020-04-28 01:55:00	28 min	55.0 deg
2020-04-28 02:26:55	28 min	51.0 deg
2020-04-28 02:56:08	28 min	48.1 deg
2020-04-28 03:25:24	28 min	46.2 deg

# H.E.S.S. observations of SGR1935+2154

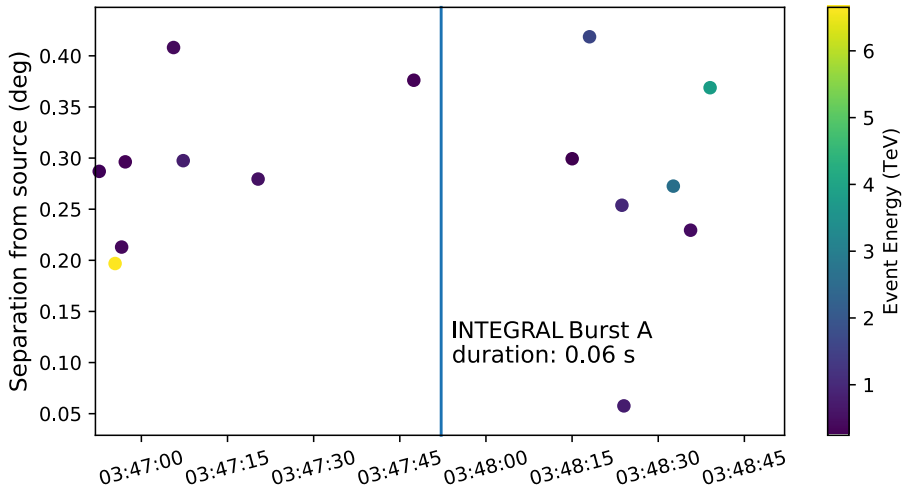


Excess (left) and significance (center) maps for SGR1935+2154 reconstructed by H.E.S.S. One-dimensional significance distribution (right) shows no detection

# Differential spectrum upper limits



# Transient search





# Conclusion

- First VHE observations of a magnetar in an active state
- No significant emission detected
- Obtained upper limits on the VHE emission in agreement with existing SGR models
- Prompt follow-up observations of magnetar bursts as novel way to study FRBs
- H.E.S.S. sensitivity well suited to study gamma-ray counterparts to FRB and restrict/confirm several models