Localising the H.E.S.S. Galactic Centre point source

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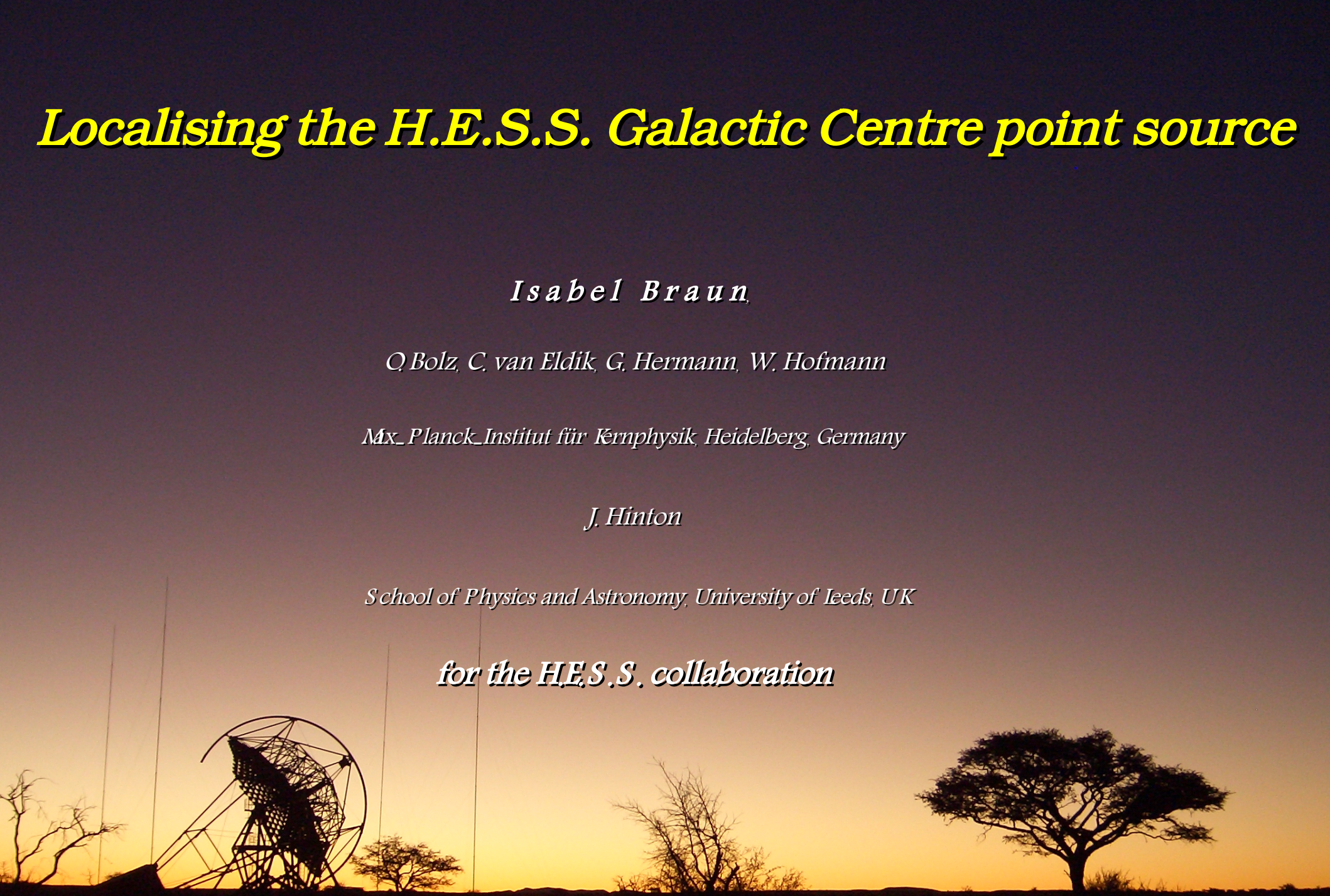
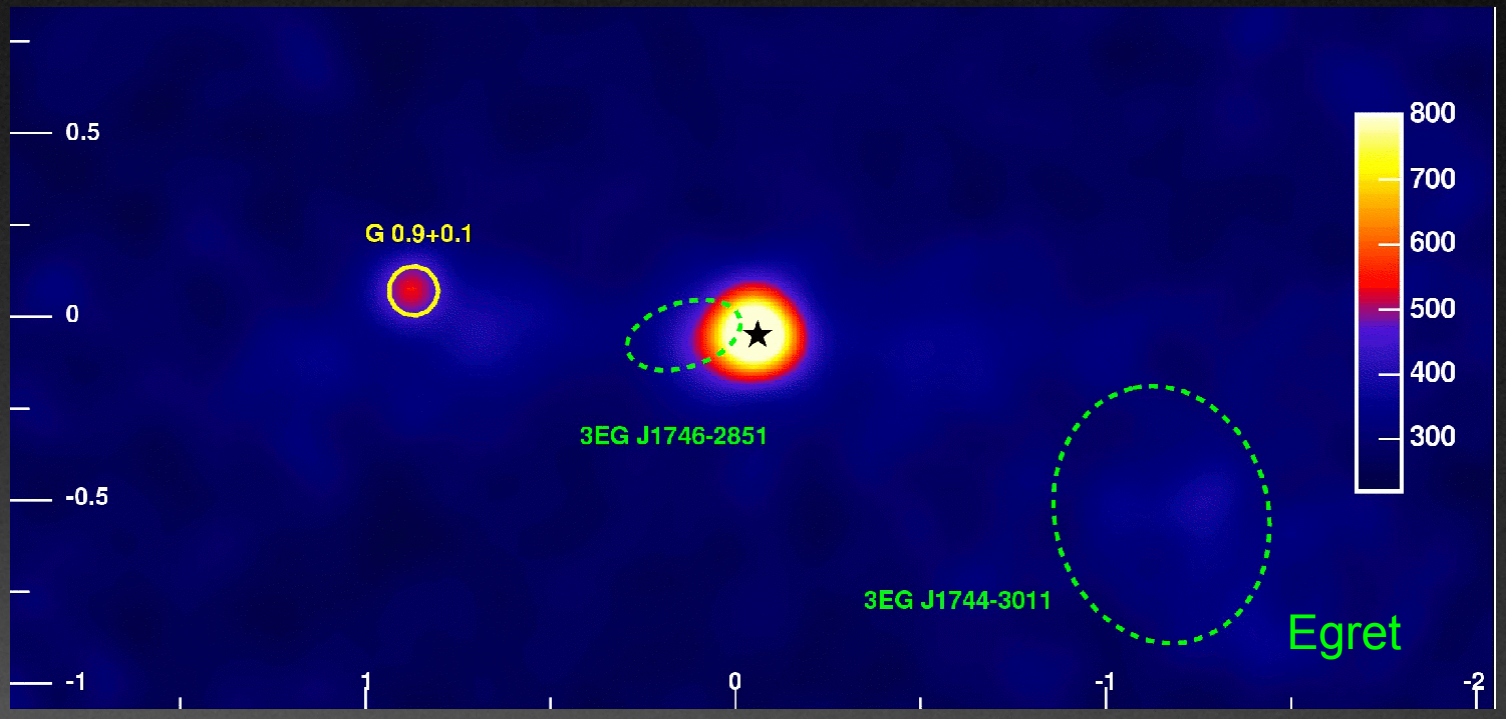
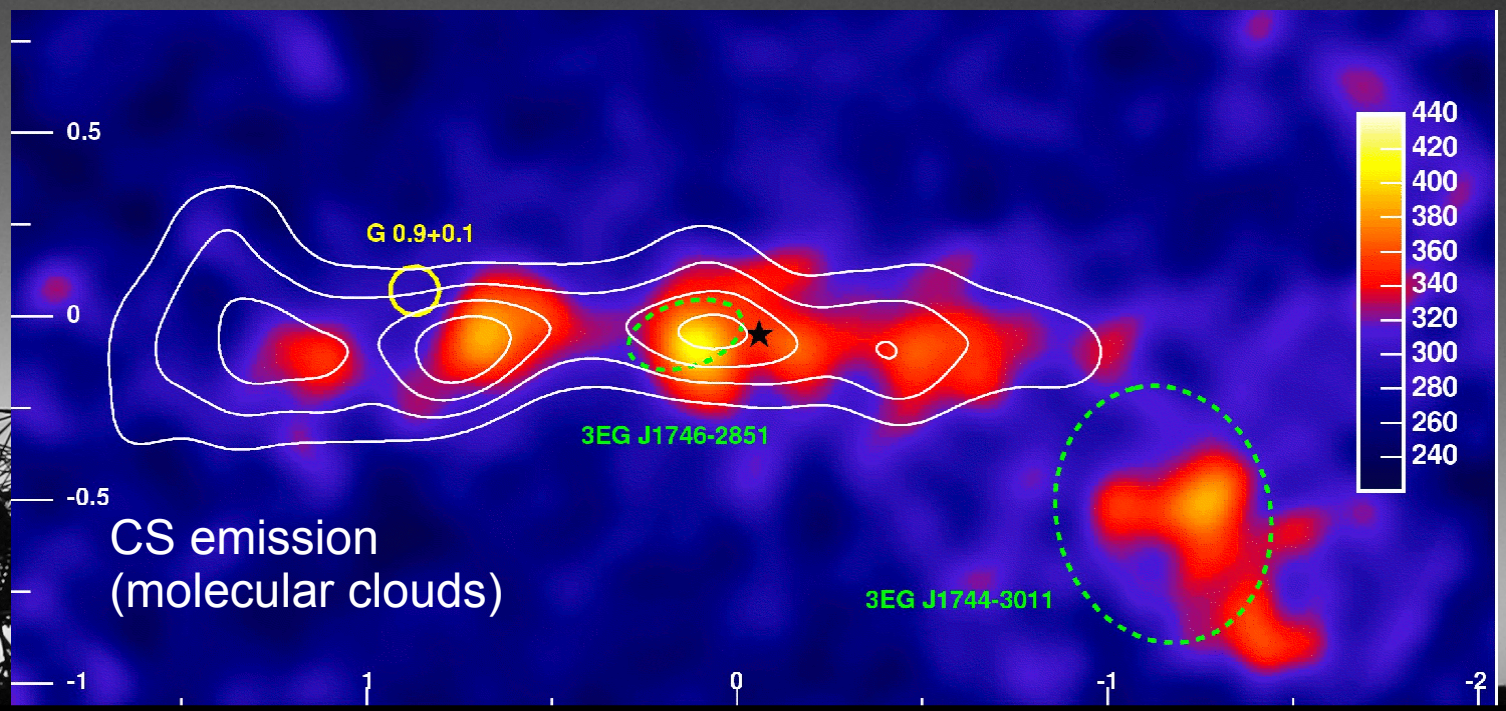


bmb+f - Förderschwerpunkt
Astro-Teilchenphysik
Großgeräte der physikalischen Grundlagenforschung

European Physical Society: HEP 2007
Manchester, July 19th 2007

HESS J1745-290

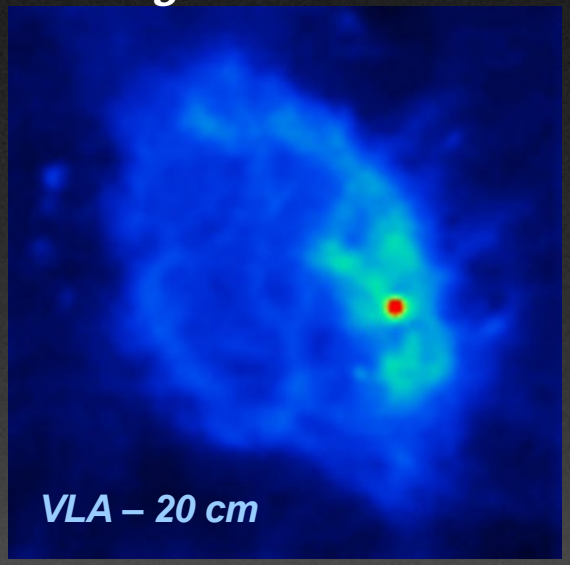




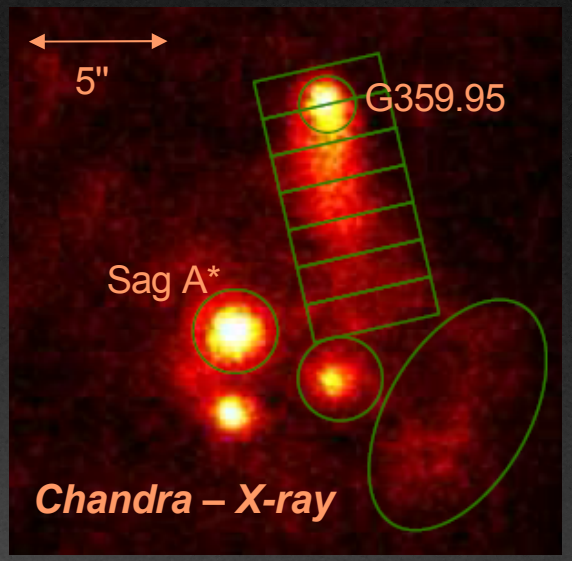
Discovery of very-high-energy gamma-rays from the Galactic Centre ridge,
H.E.S.S. collaboration, F. Aharonian et al., Nature 439 (2006) 695-698

possible counterparts

SNR Sgr A East



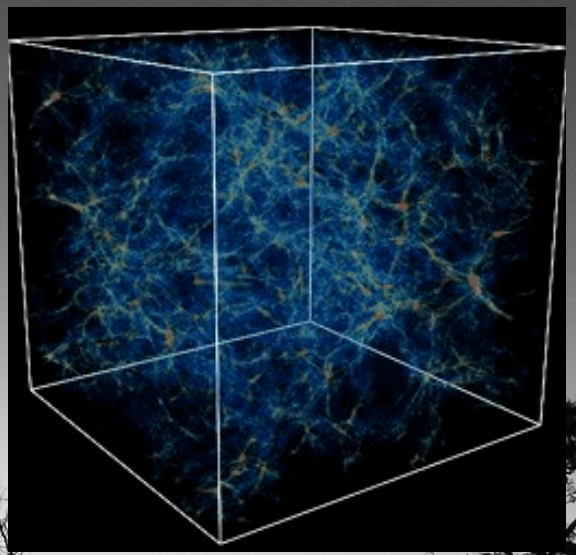
PWN G359.95-0.04



?

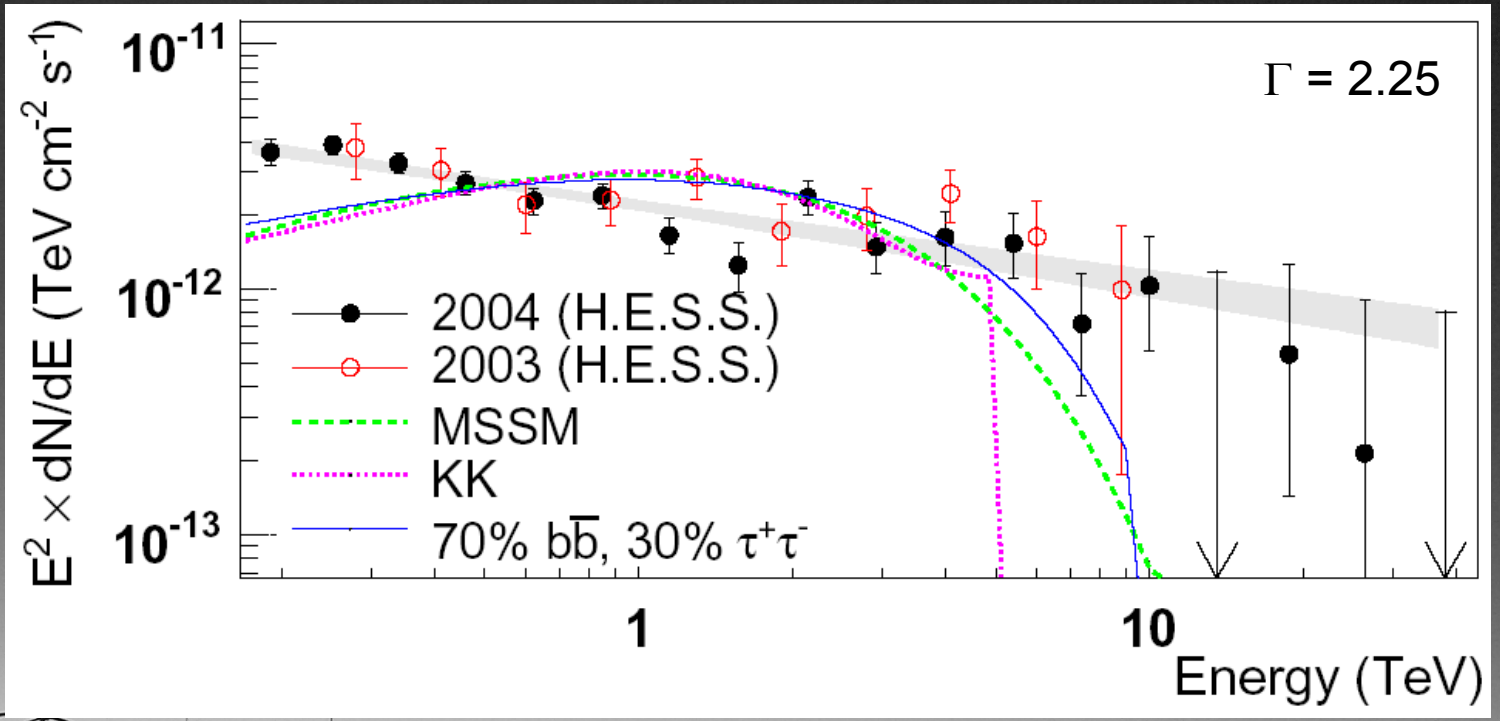
SMBH Sgr A*

Dark Matter

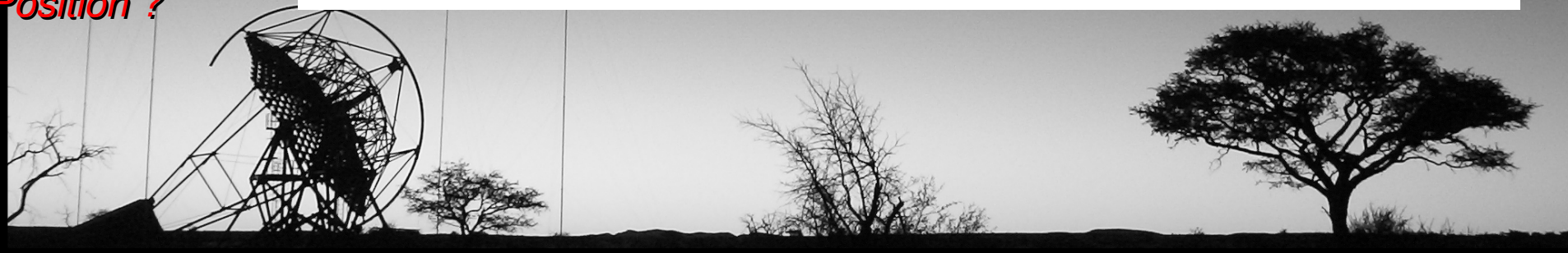


possible identification tools

- *Extension* — *Point-like for H.E.S.S.*
- *Variability* — *No variability on timescales of years to minutes detected*
- *Spectrum*

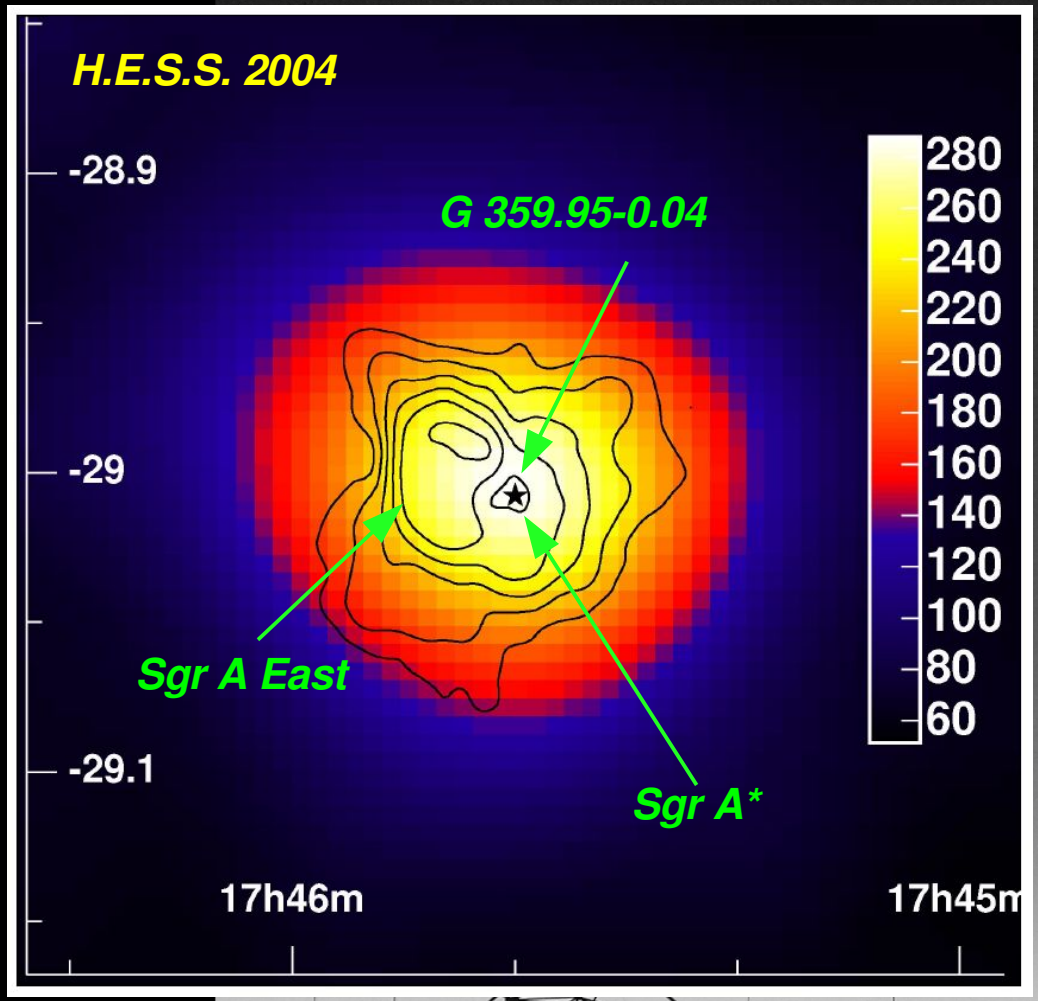


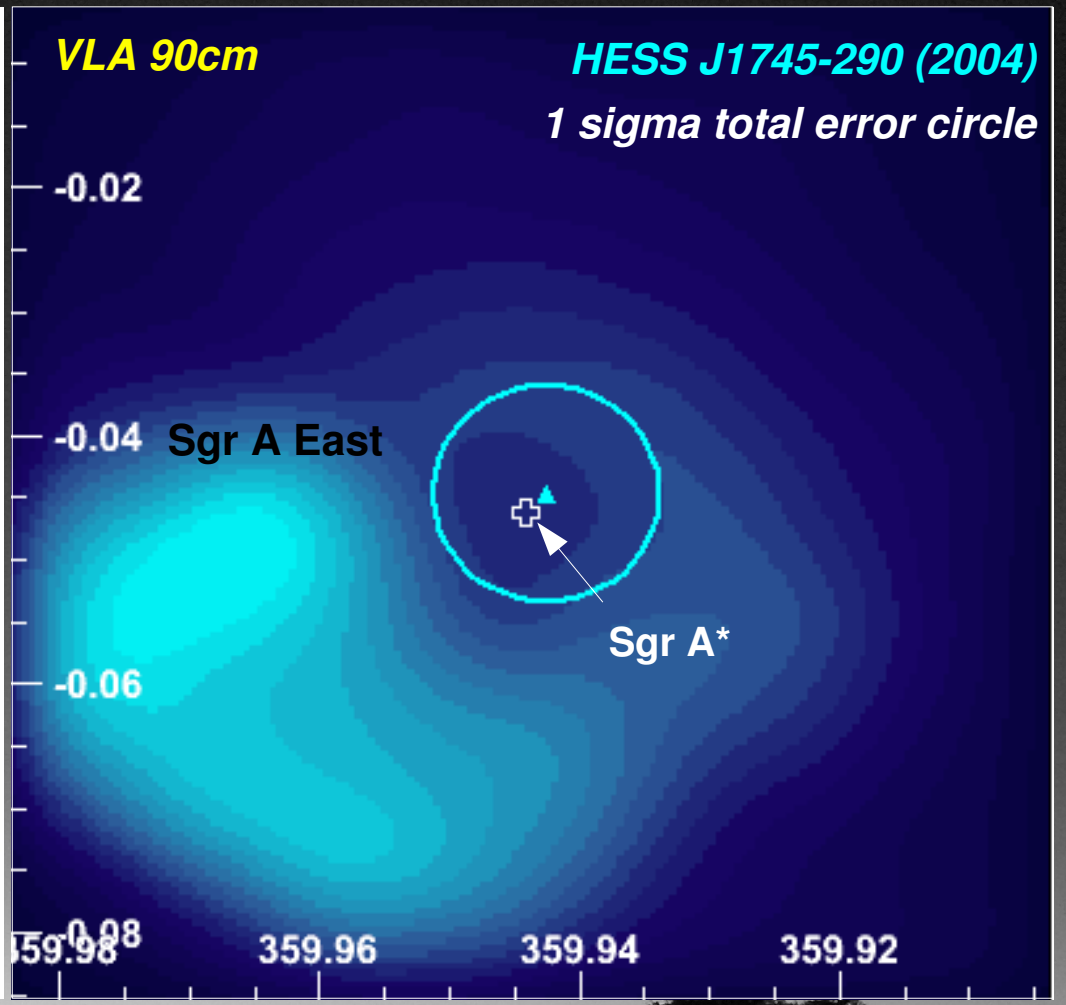
- *Position ?*

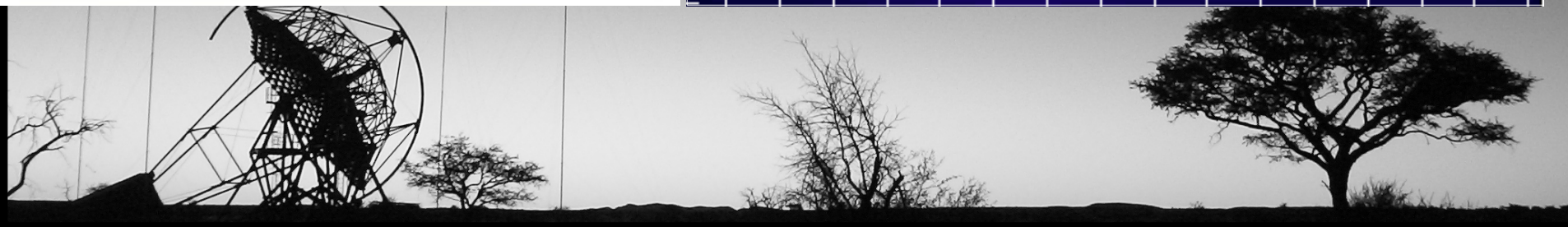


H.E.S.S. observations of the Galactic Center region and their possible dark matter interpretation, H.E.S.S. collaboration, F. Aharonian et al., Phys. Rev. Lett. 97 (2006) 221102

Position of HESS J1745-290

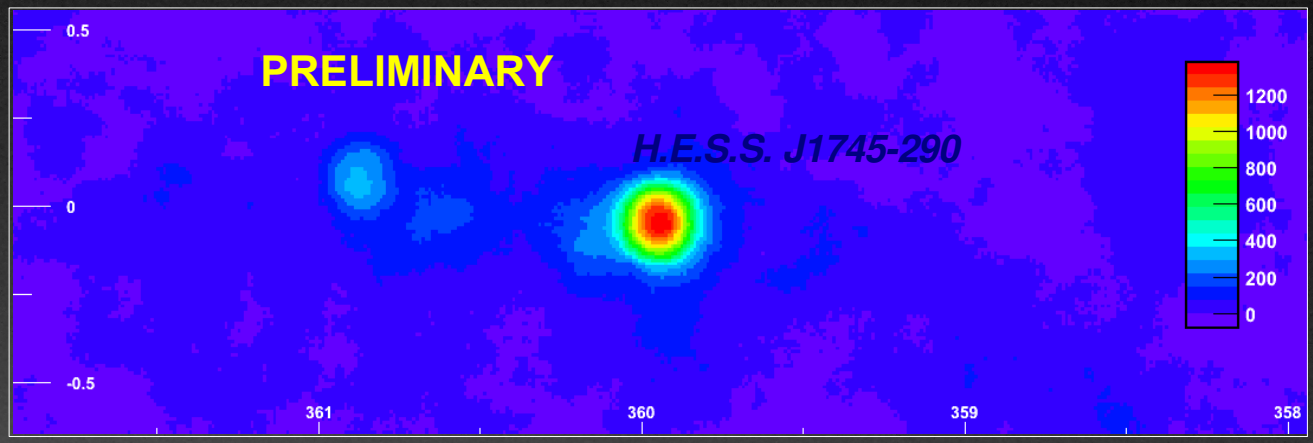






Pointing Improvements

- *New data 2005/2006:*
  - *73.2 h live time*
  - *44 σ significance*
  - *0.07° ang.res./event*



- *Improved Pointing Calibration :*
  - *new method using guiding telescopes*
  - *systematic error reduced from 28" to 9"!*

Position using 2005/2006 data

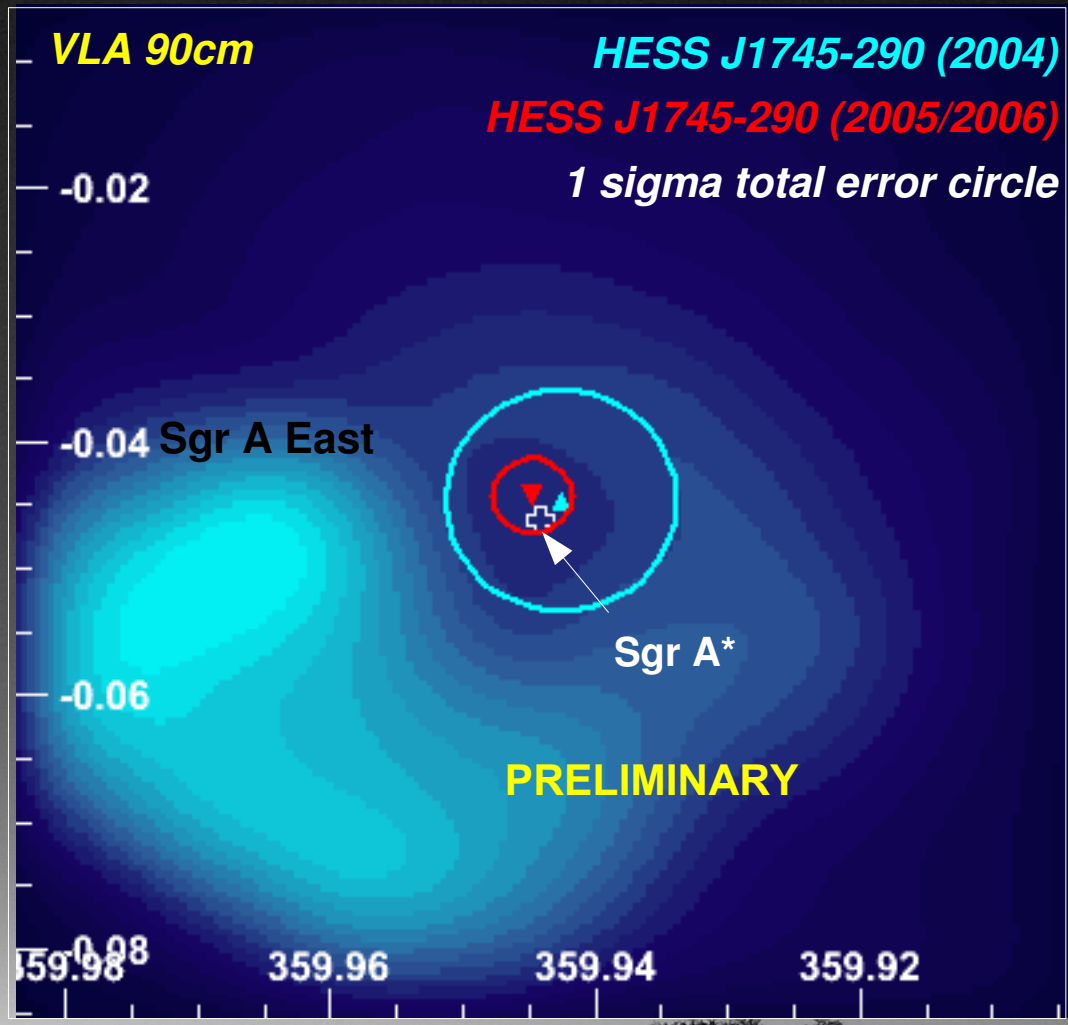
- best fit position:

l = 359d56'41.1" +/- 6.4" +/- 6"
b = -0d2'39.2" +/- 5.9" +/- 6"

preliminary statistical + systematic errors

- point-like after subtraction of diffuse emission

- position no longer dominated by pointing systematics



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- best fit position:

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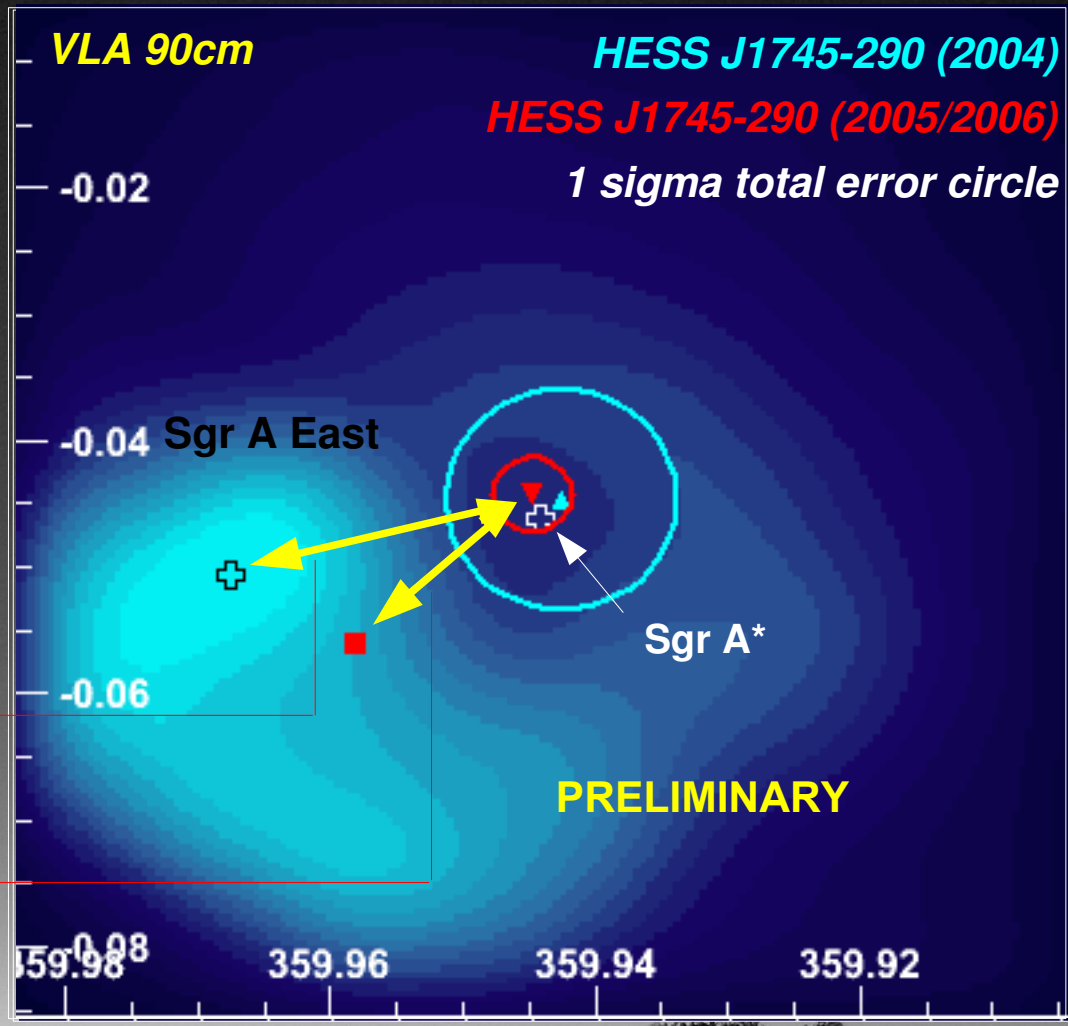


Assumptions

- VHE from Sgr A East radio maximum

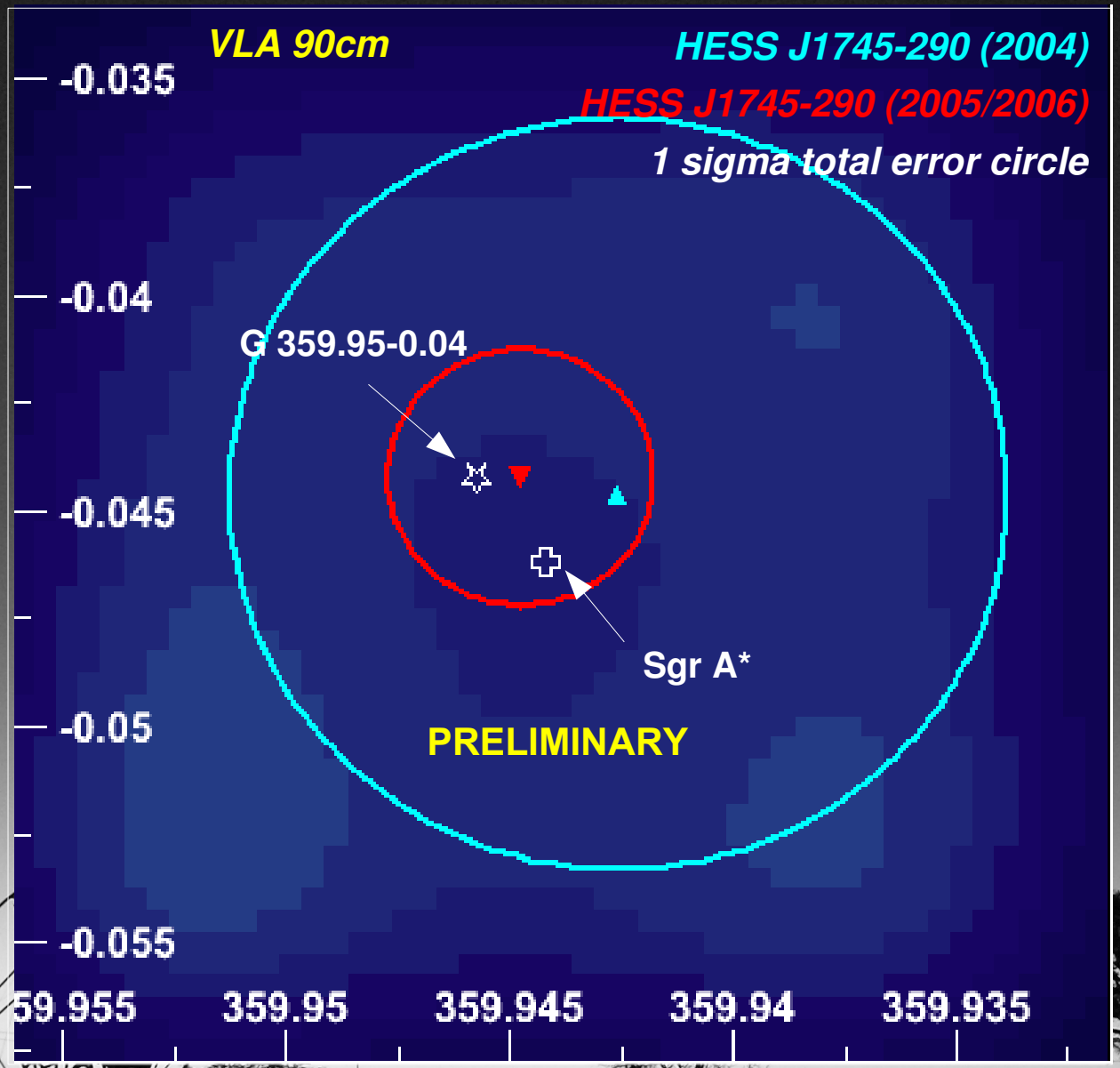
  -> excluded at 7σ level

- VHE follows radio emission

  -> excluded at 5.3σ level

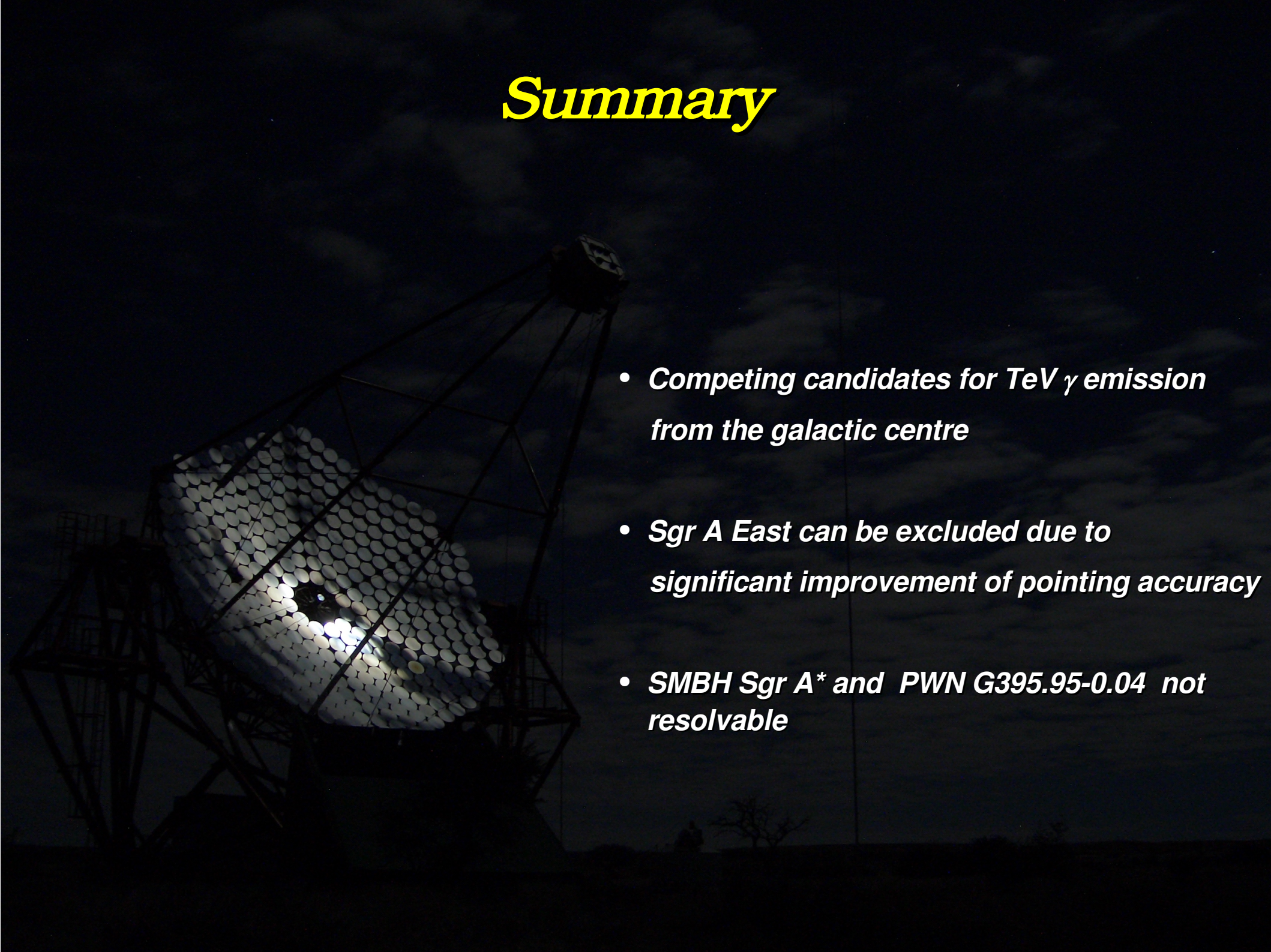
-> bulk of TeV Gamma emission not from SNR Sgr A East!

Position using 2005/2006 data



-> good agreement for black hole and PWN

Summary



- *Competing candidates for TeV γ emission from the galactic centre*
- *Sgr A East can be excluded due to significant improvement of pointing accuracy*
- *SMBH Sgr A* and PWN G395.95-0.04 not resolvable*