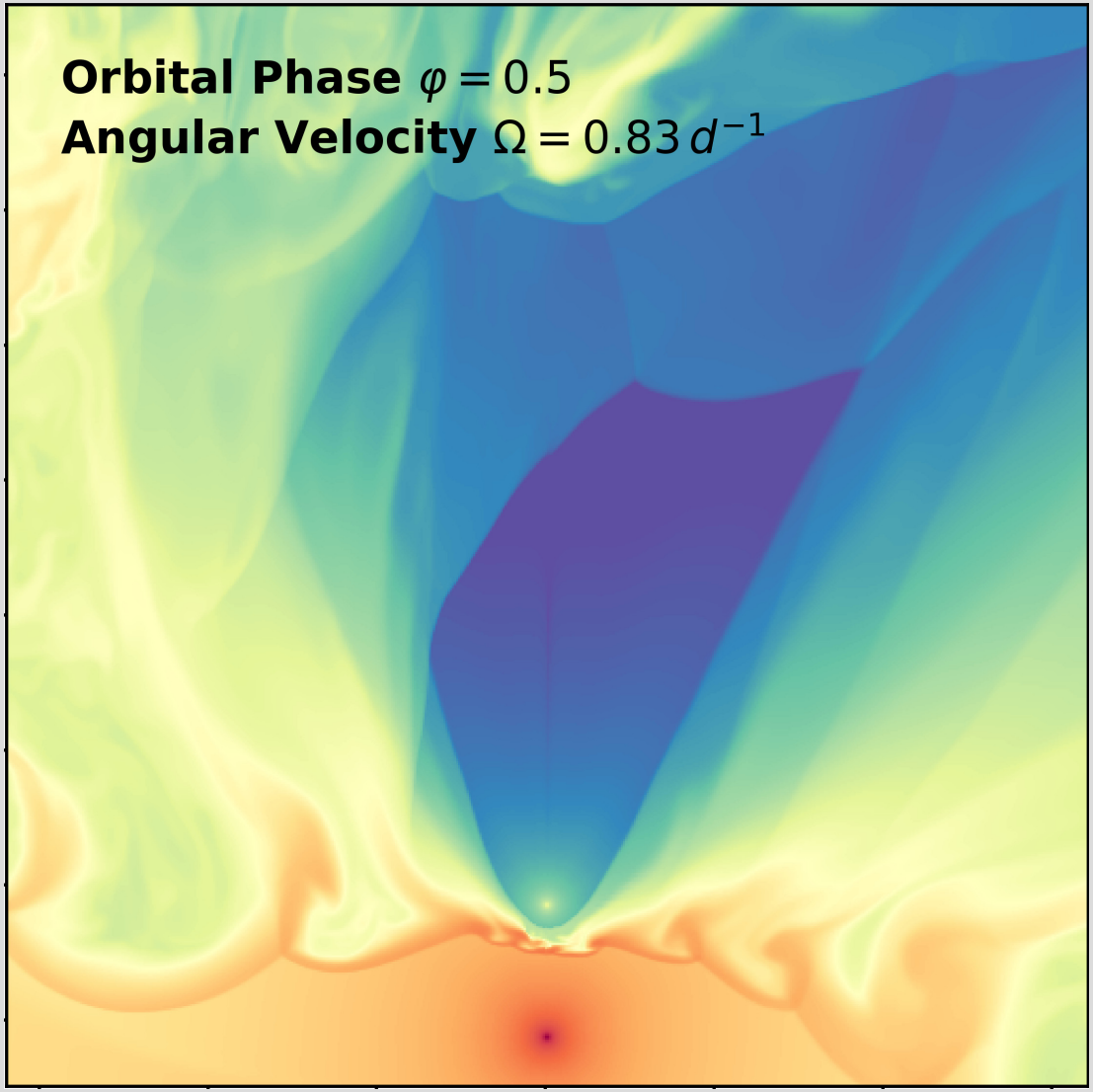
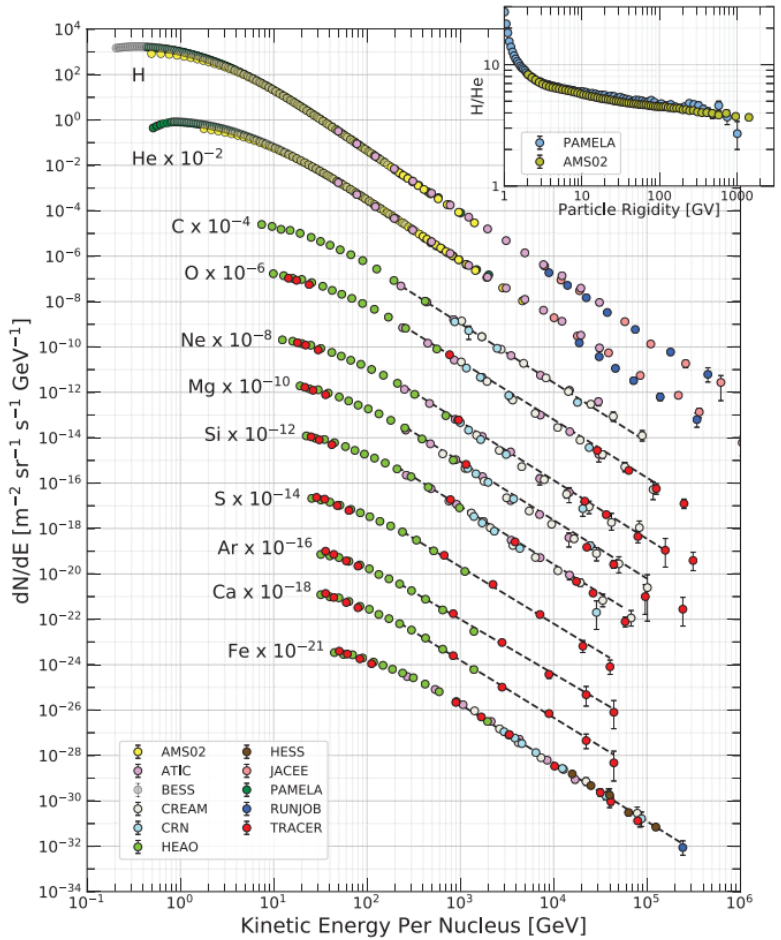
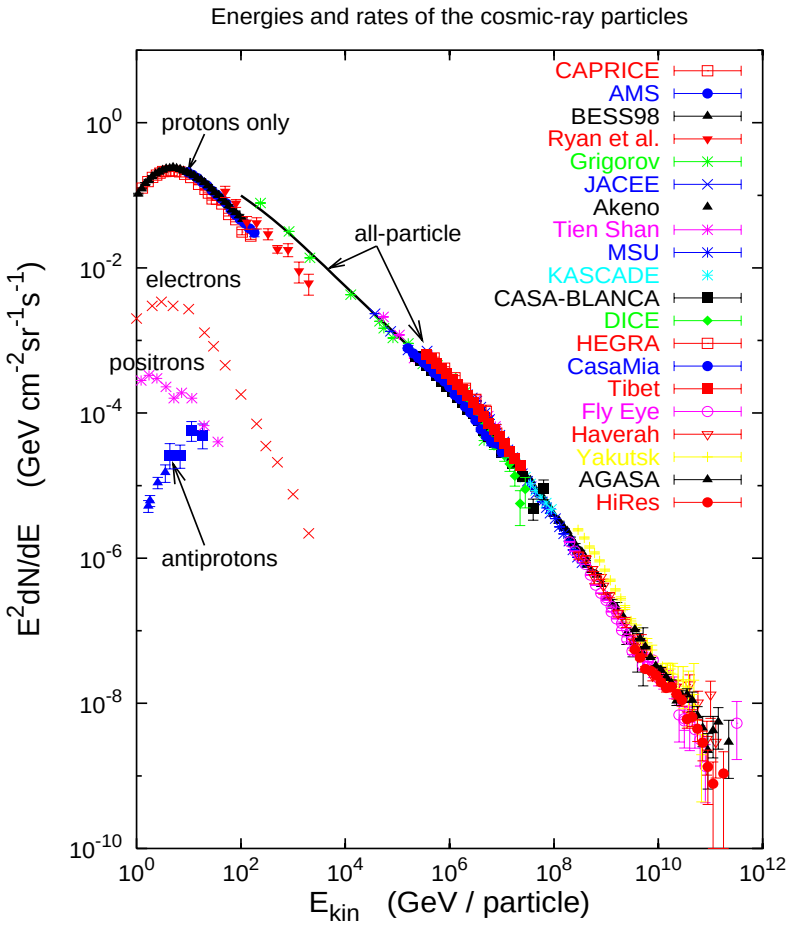

Orbital Phase $\varphi = 0.5$
Angular Velocity $\Omega = 0.83\,d^{-1}$

Galactic Cosmic Rays



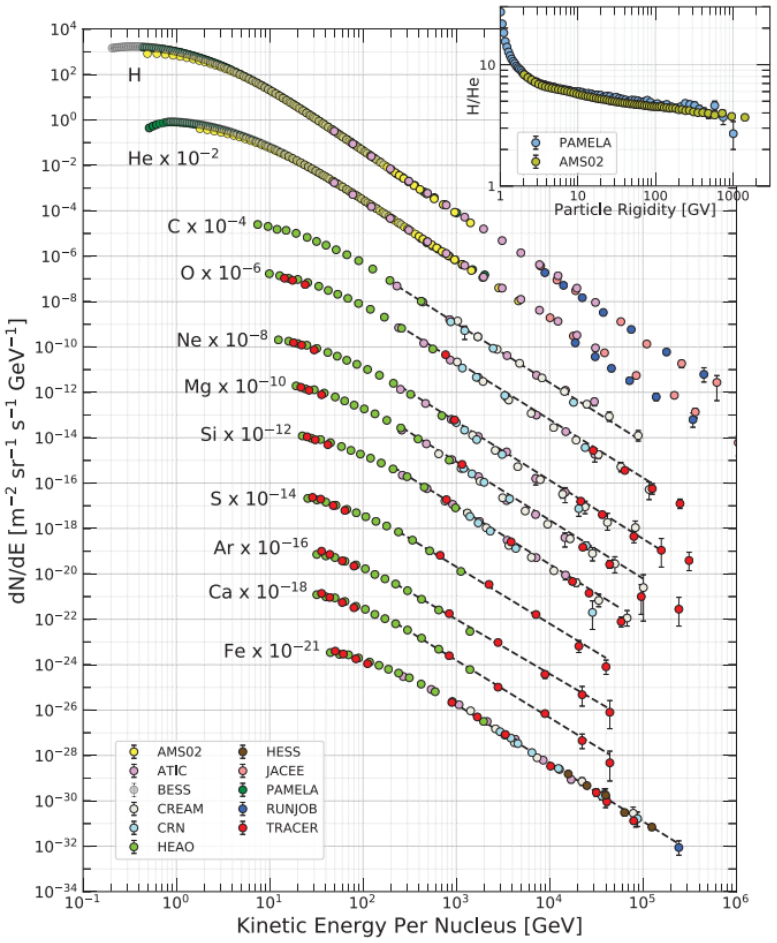
Observations of Cosmic Rays

All Cosmic Rays



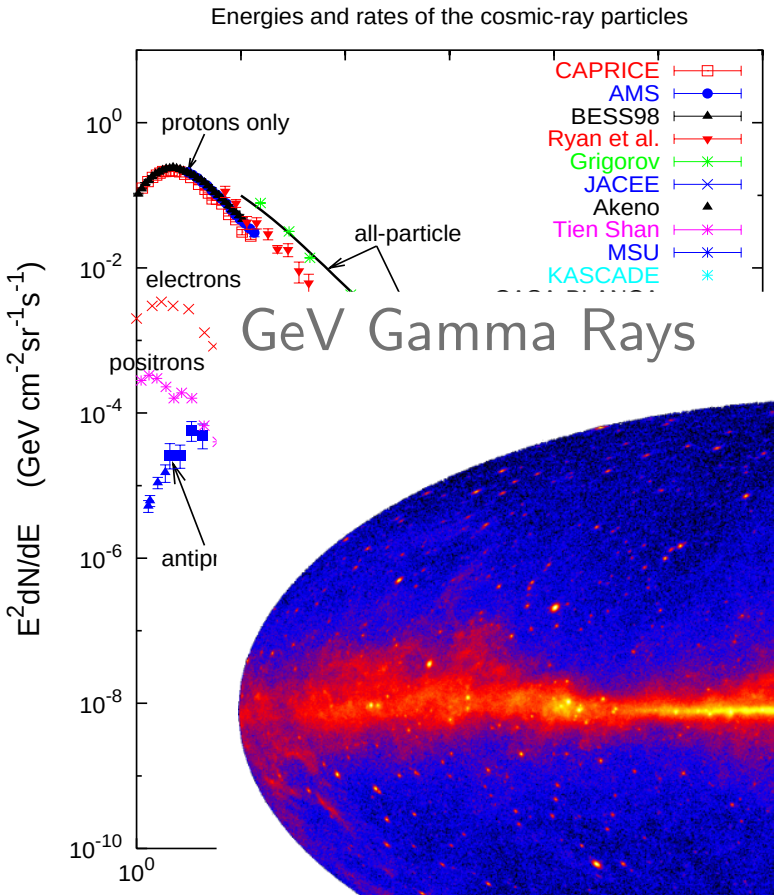
(Hillas (2006))

Galactic Cosmic Rays

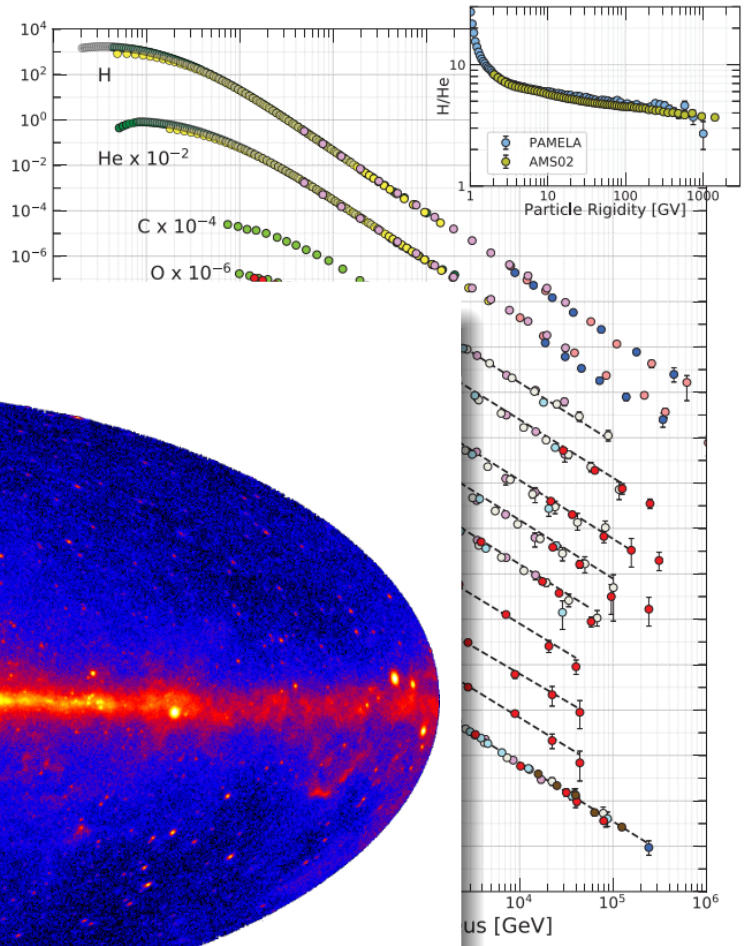


Observations of Cosmic Rays

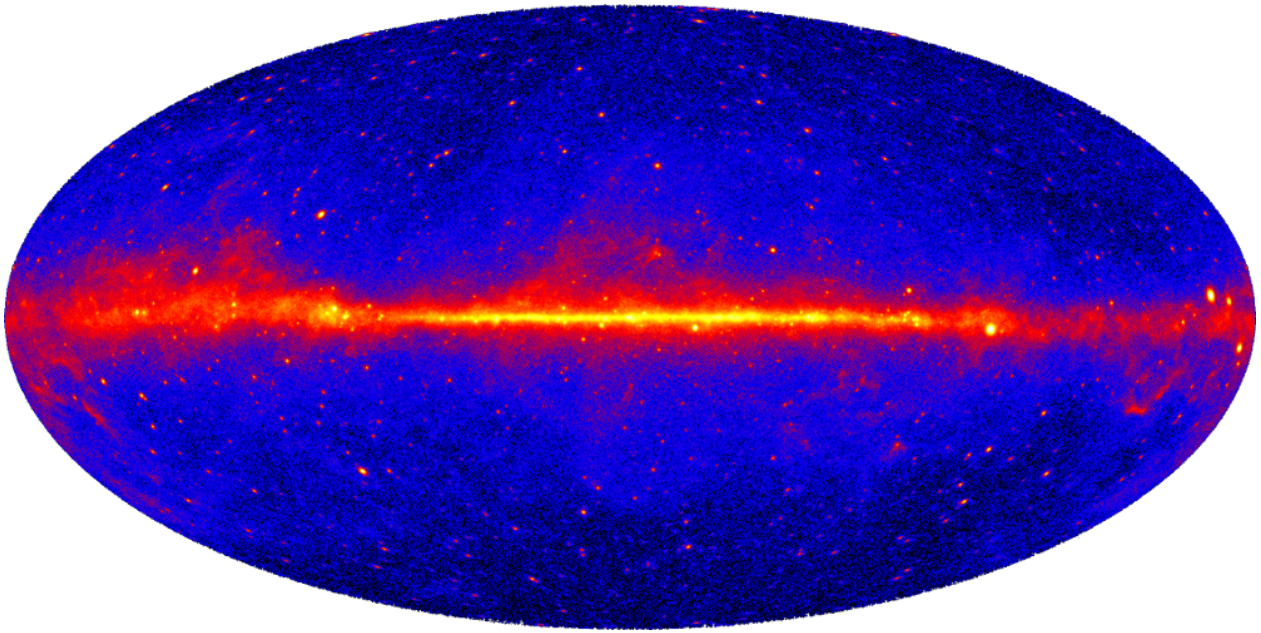
All Cosmic Rays



Galactic Cosmic Rays



GeV Gamma Rays



(Image credit: NASA/DOE/Fermi LAT Collaboration)

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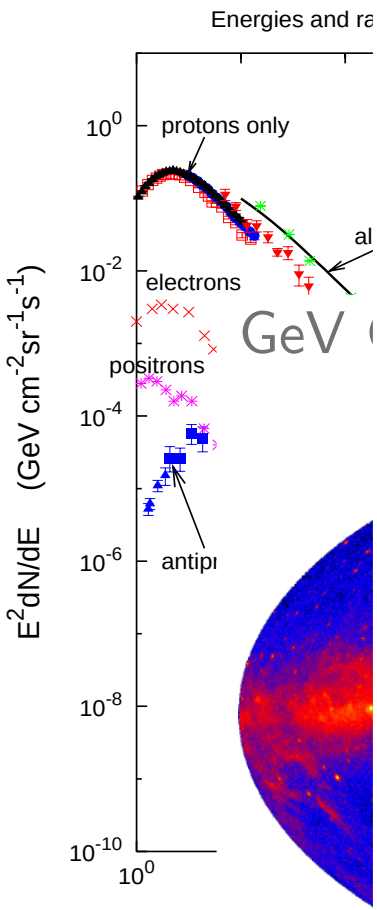
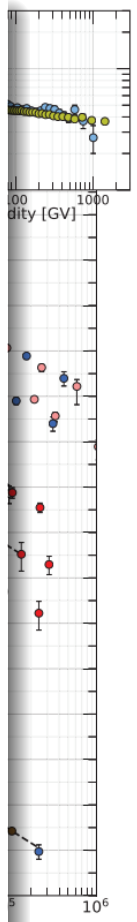
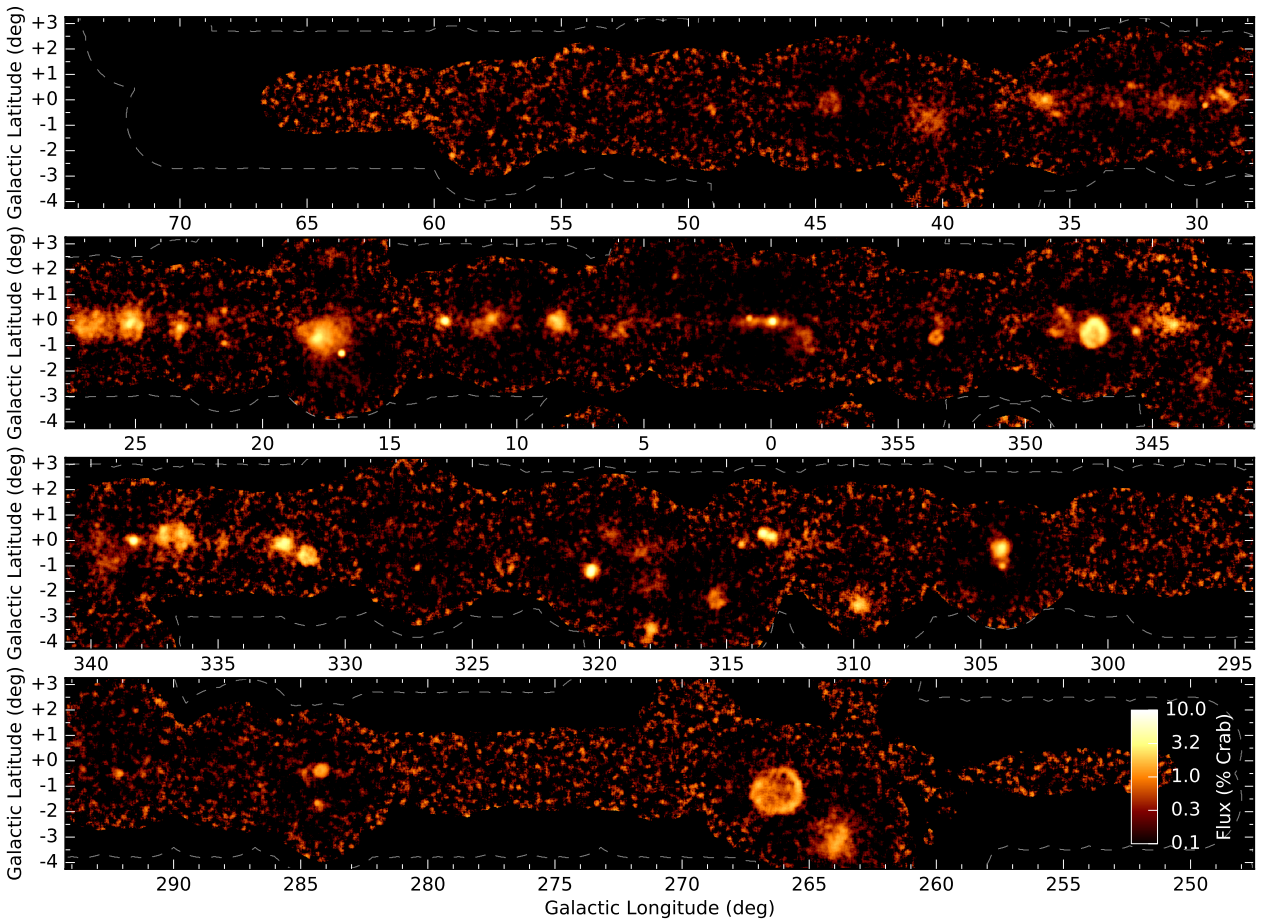
All Cosmic Rays



Galactic Cosmic Rays



TeV Gamma Rays



(H. E. S. S. Collaboration et al. (2018))

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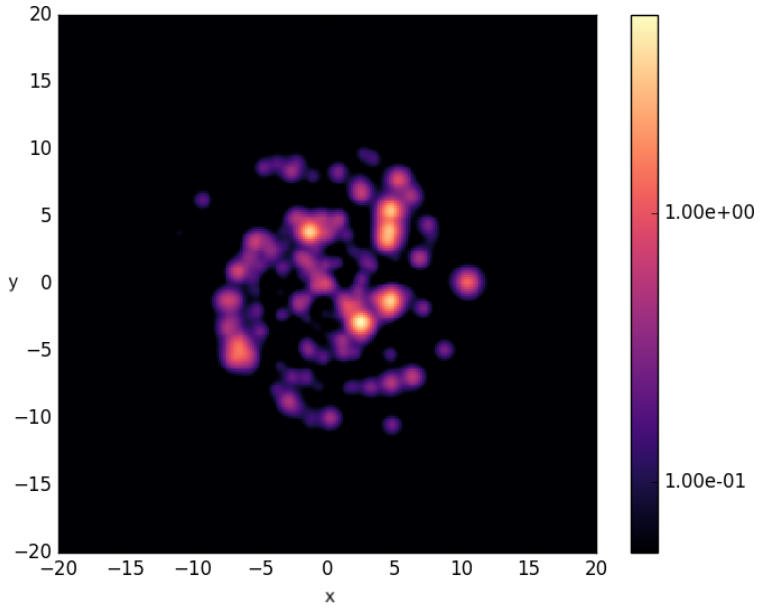
How To Get From Here...



(Thaler (2019))

Field 1: Galactic CR Transport

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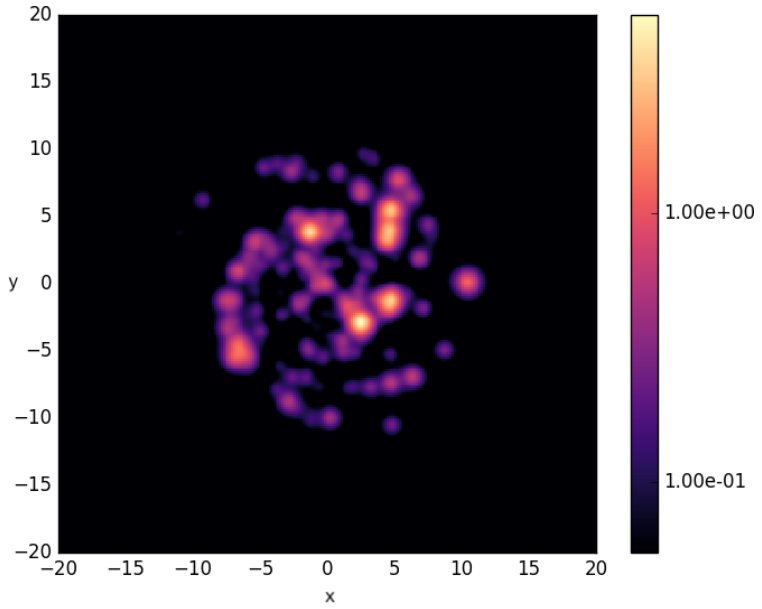
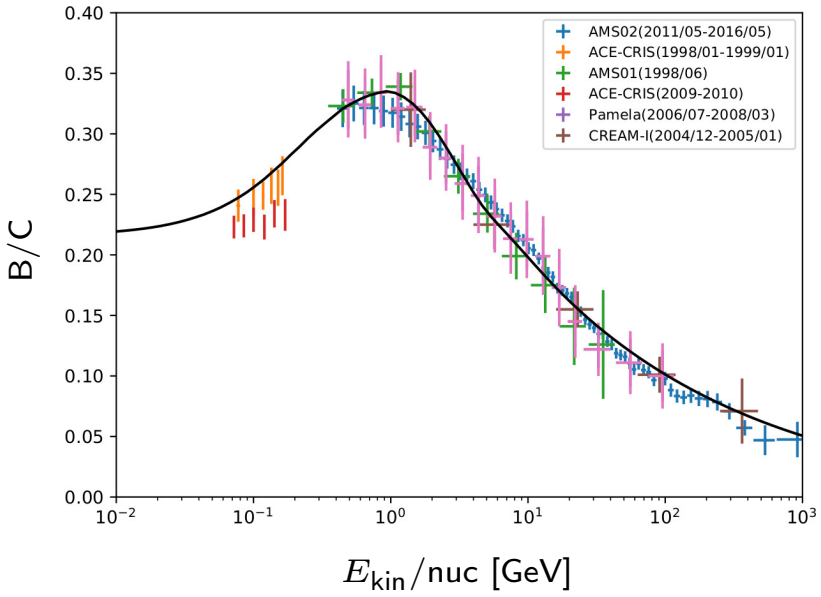
How To Get From Here...



(Thaler (2019))

... To There ...



(Picard (2018))

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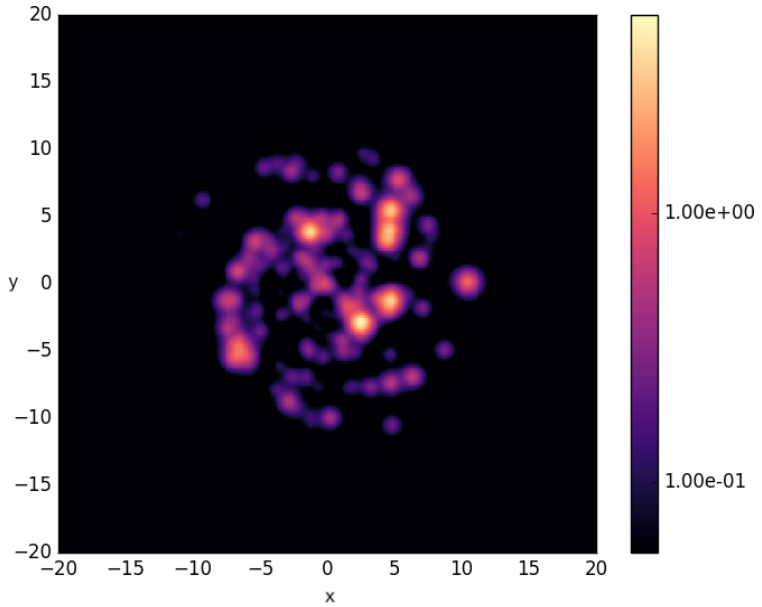
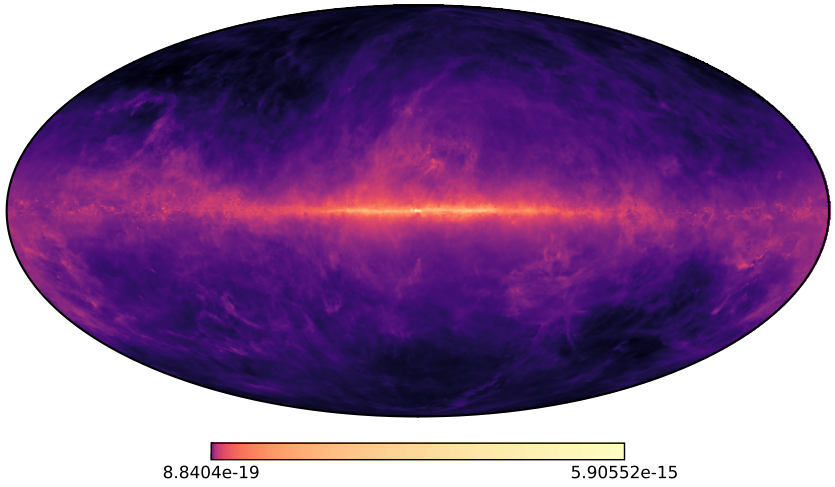
How To Get From Here...



(Thaler (2019))

...and There



(Thaler (2019))

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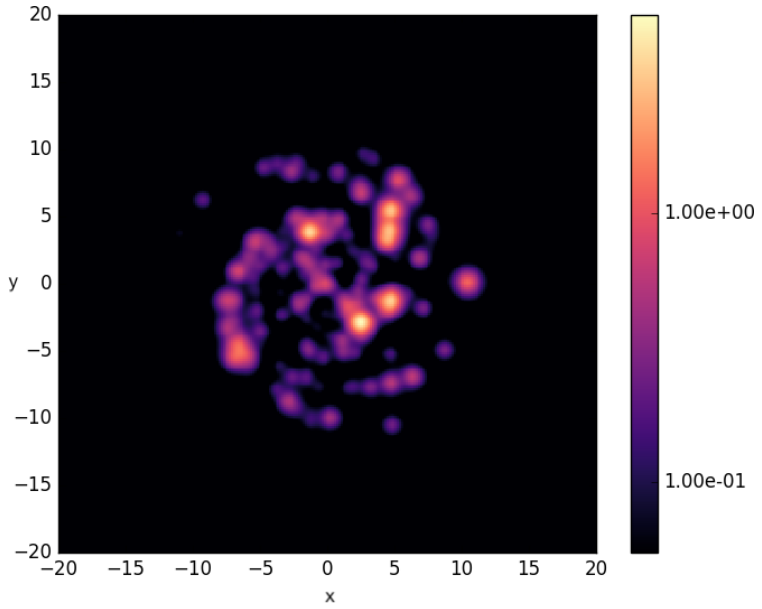
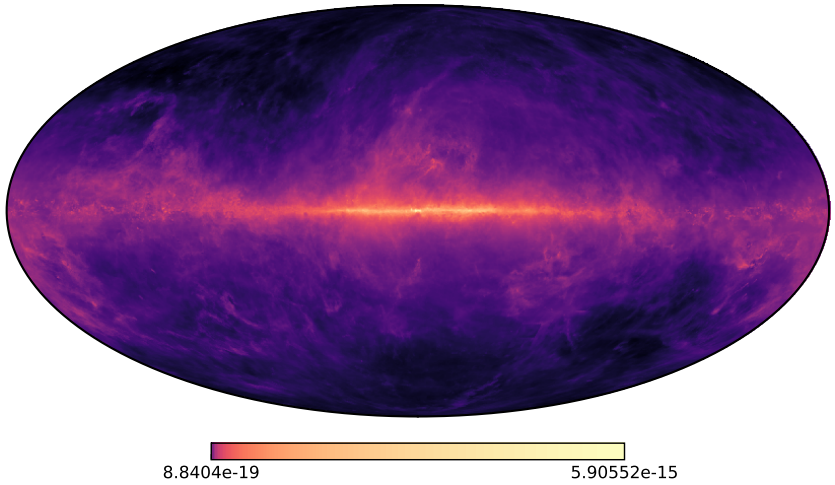
How To Get From Here...



(Thaler (2019))

...and There



(Thaler (2019))

Galactic CR Transport

- Transport of CRs
- Interaction with ISM
- Emission of gamma rays

Field 1: Galactic CR Transport

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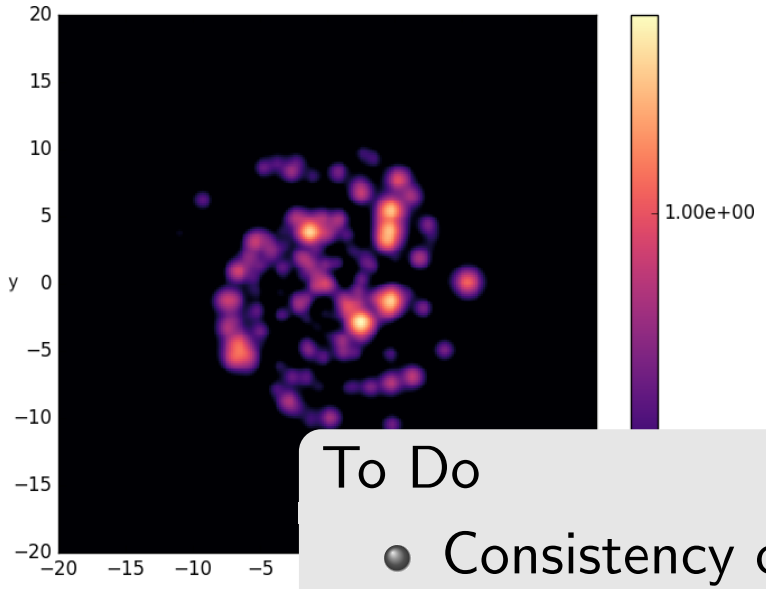
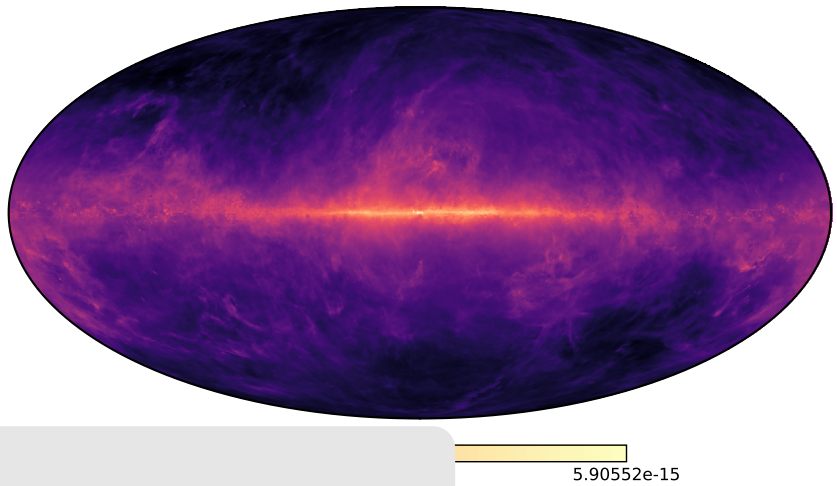
How To Get From Here...



...and There



(Thaler (2019))

To Do

- Consistency of CRs & gamma rays
- Dynamics
- Numerical accuracy

nsport

- Transport of CRs
- Interaction with ISM
- Emission of gamma rays

Field 2: Cosmic-Ray Sources

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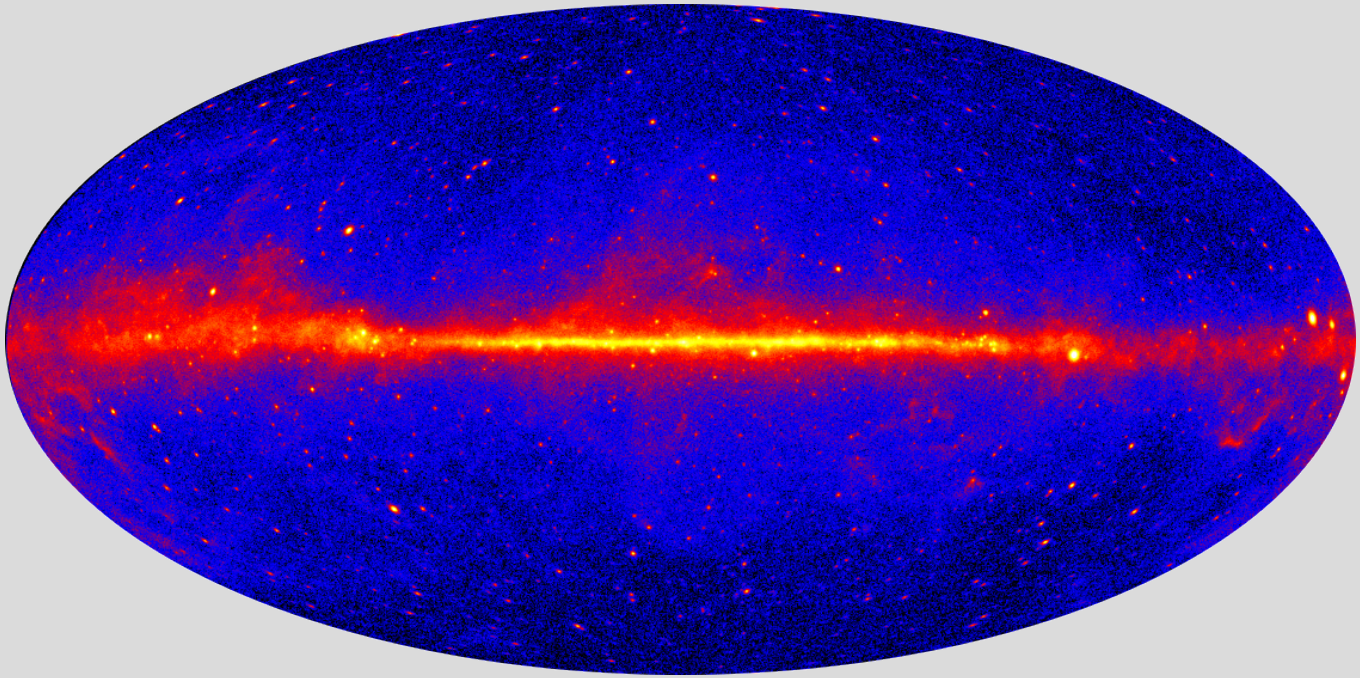

Field 2: Cosmic-Ray Sources

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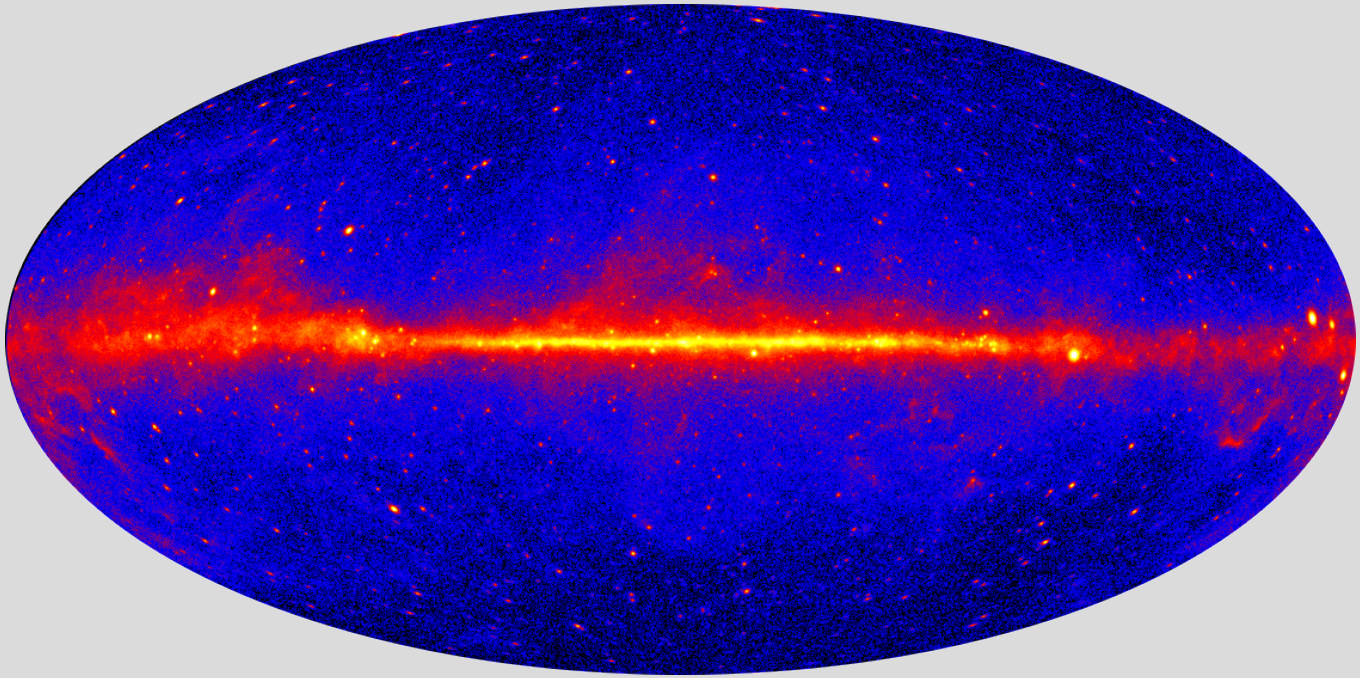

Gamma-Ray Emitters

- Sources
- Unresolved sources
- Diffuse emission
- Dark matter

Field 2: Cosmic-Ray Sources

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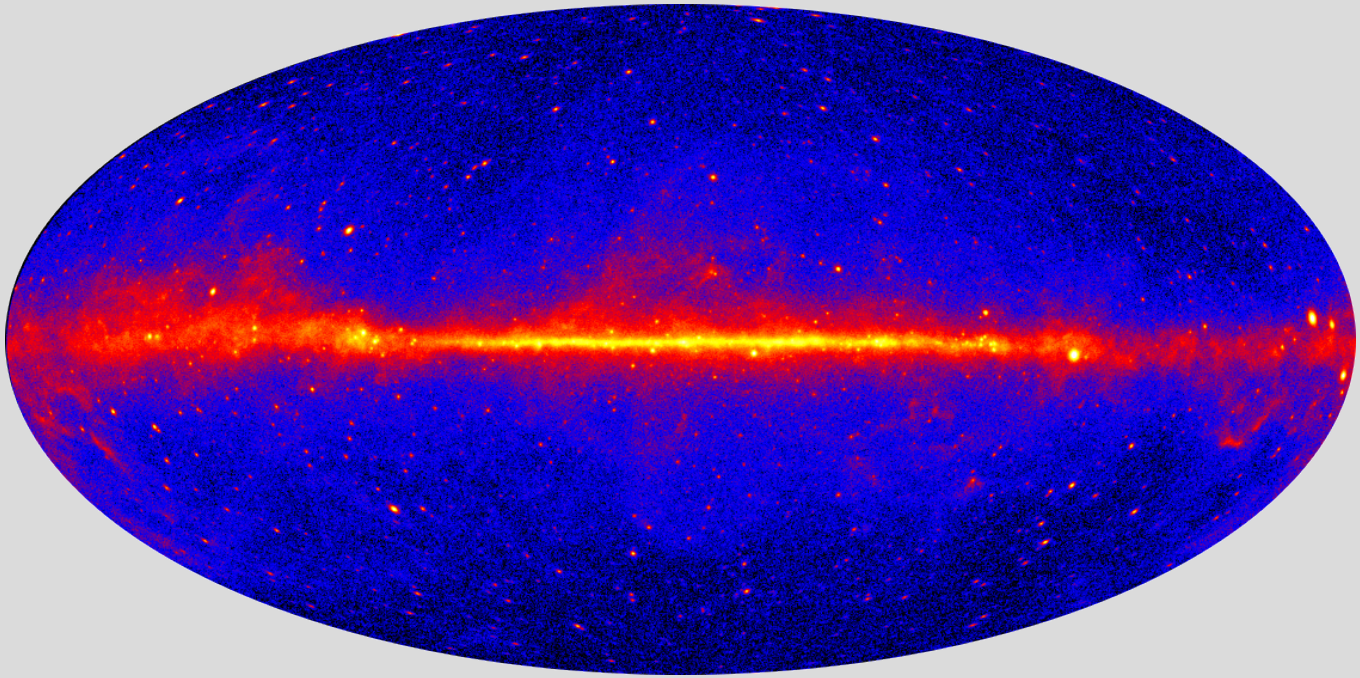

Gamma-Ray Emitters

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- Dark matter

Possible Galactic Sources

- Supernova remnants
- Pulsars / Pulsar winds
- Binary stars

Field 2: Cosmic-Ray Sources

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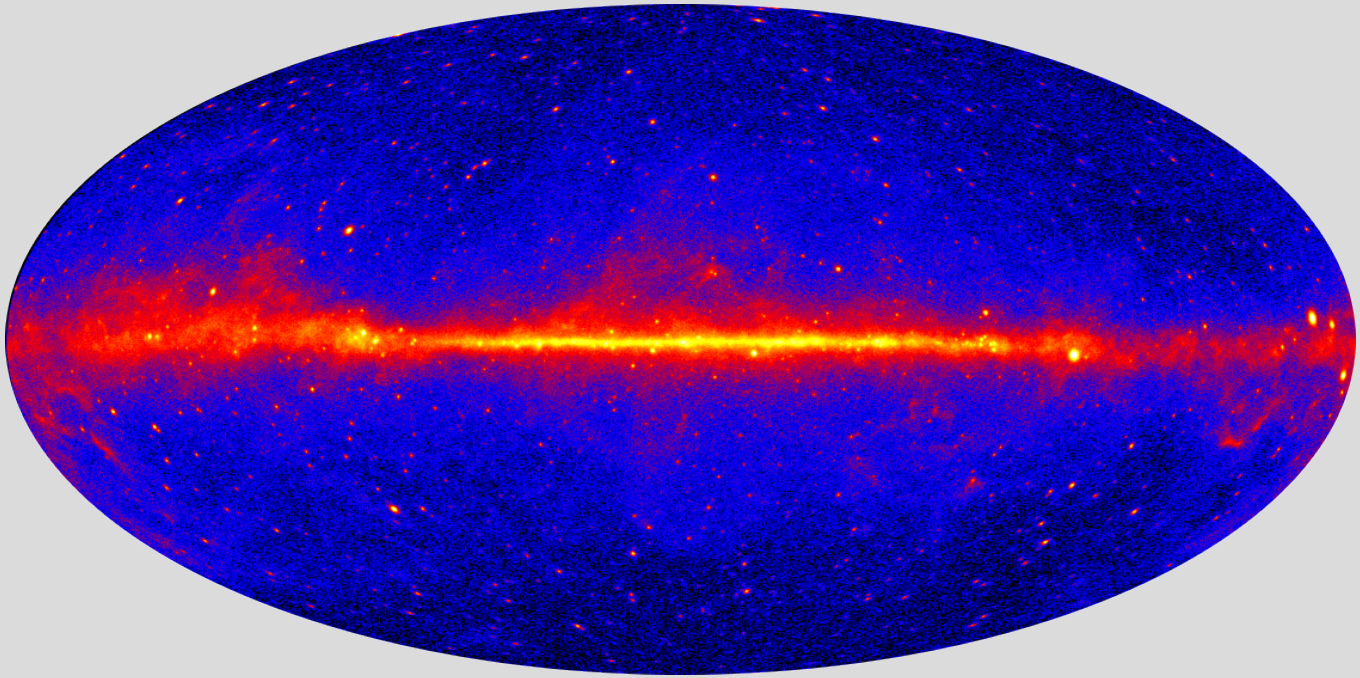

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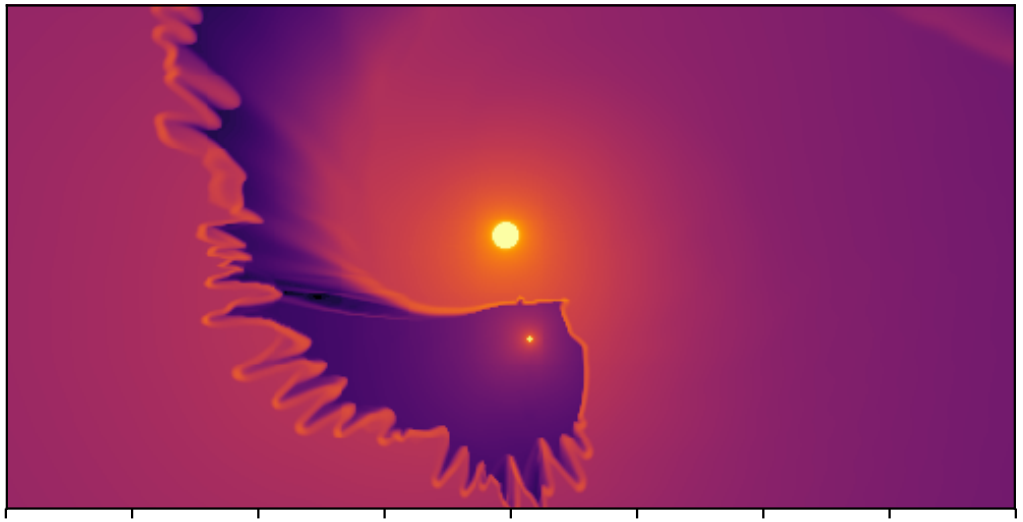
Collinding Stellar Winds



(Kissmann (2019))

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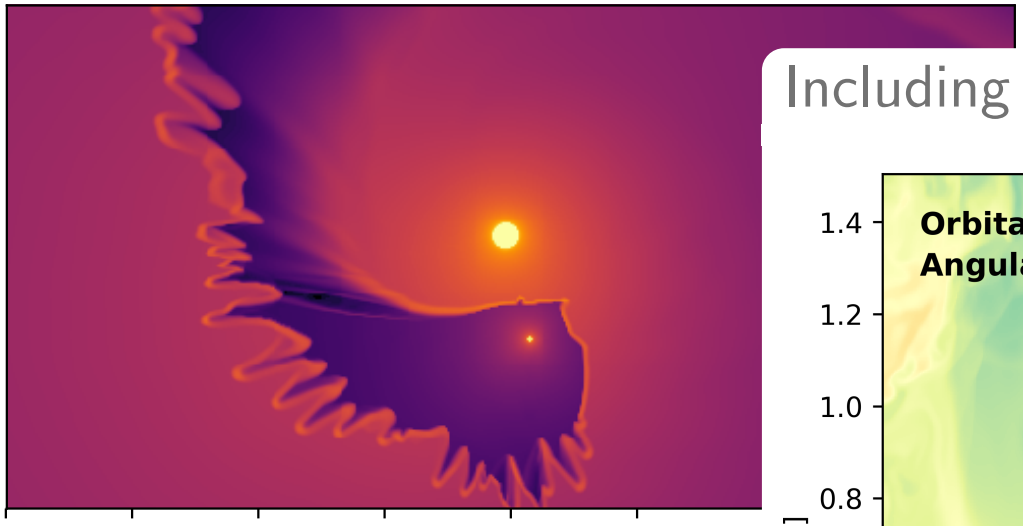
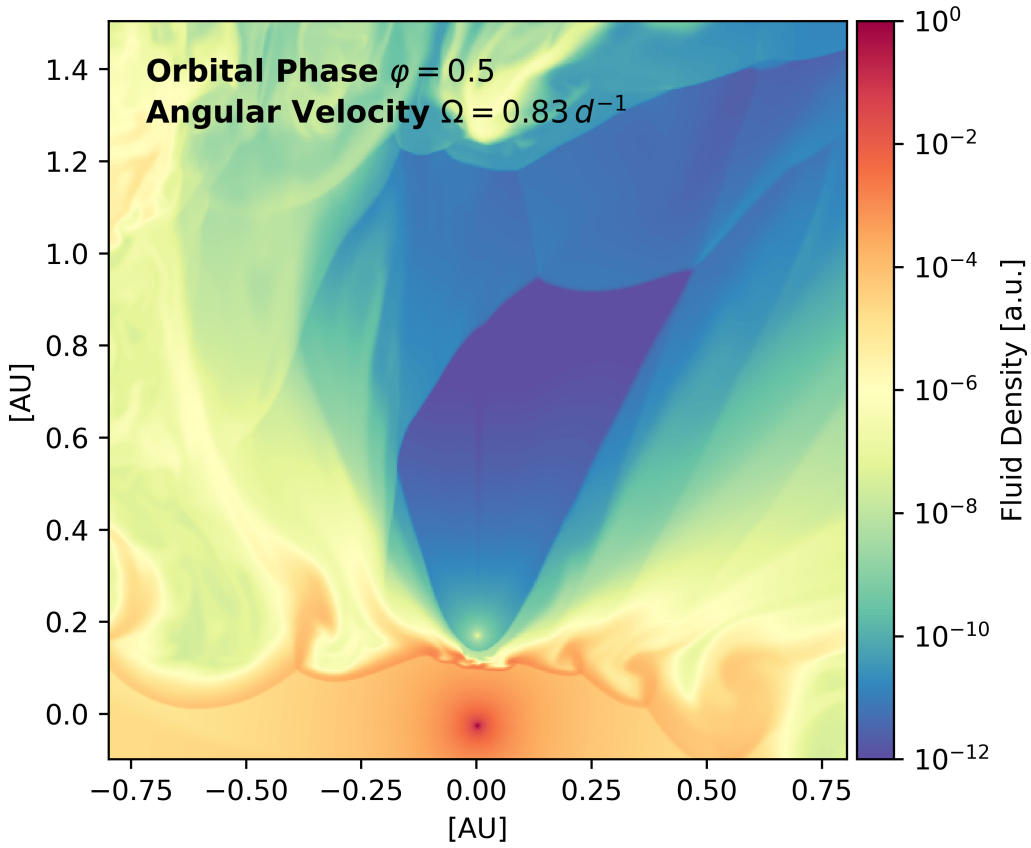
Collinding Stellar Winds



(I

Including a Pulsar



(Huber (2020))

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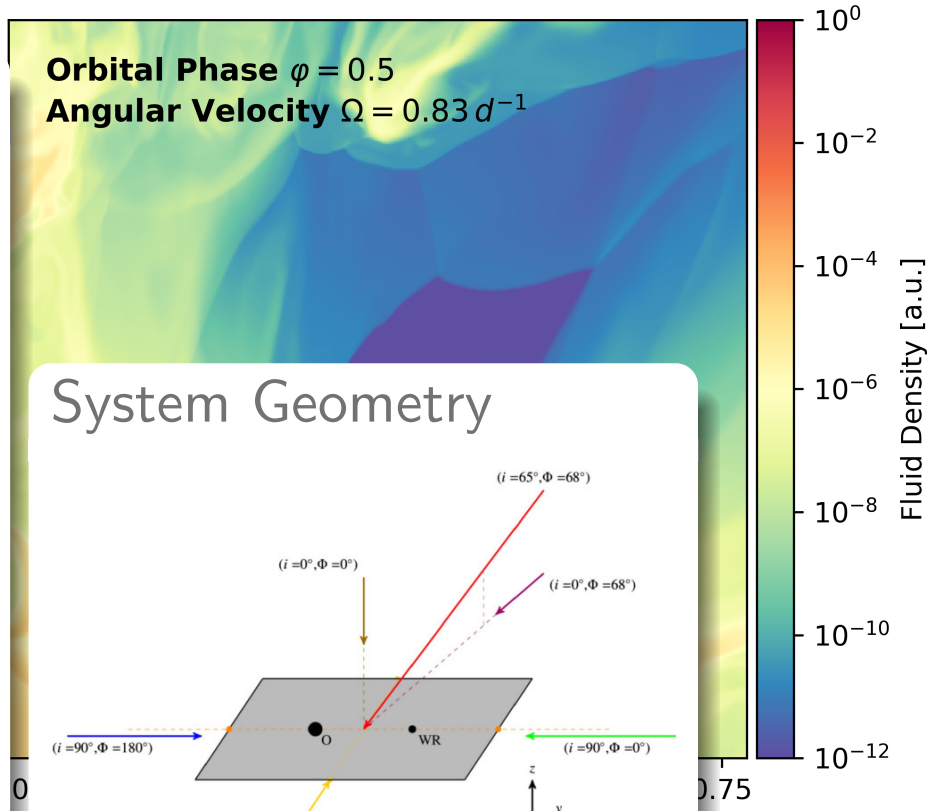
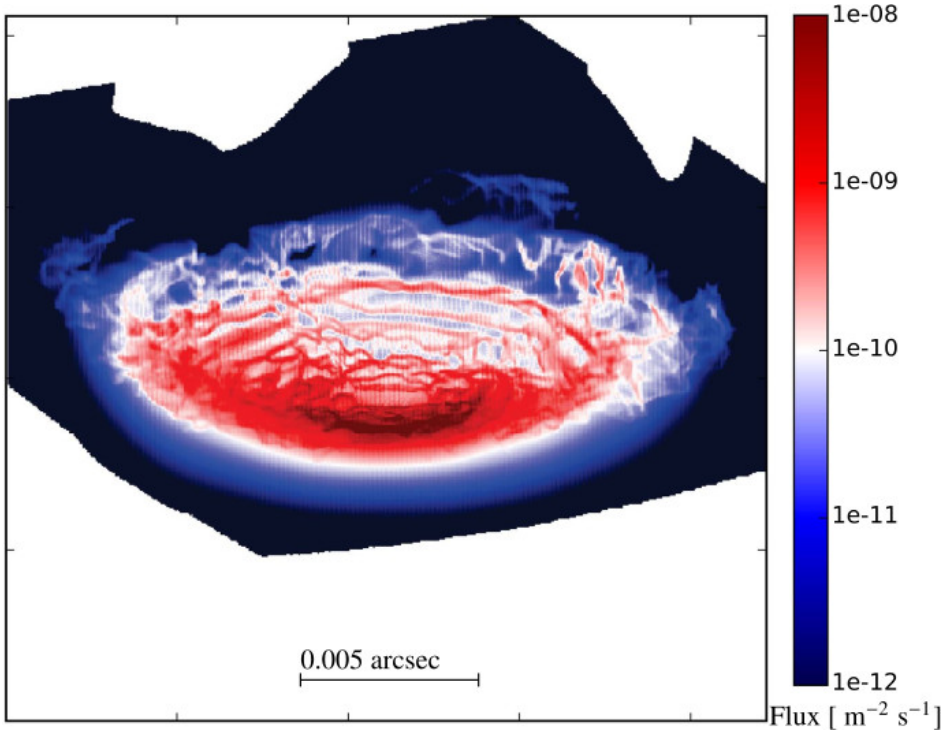
Collinding Stellar Winds

Including a Pulsar



(Huber (2020))

Gamma-Ray Emission



(Reitberger et al. (2017))

System Geometry

(Reitberger et al. (2017))

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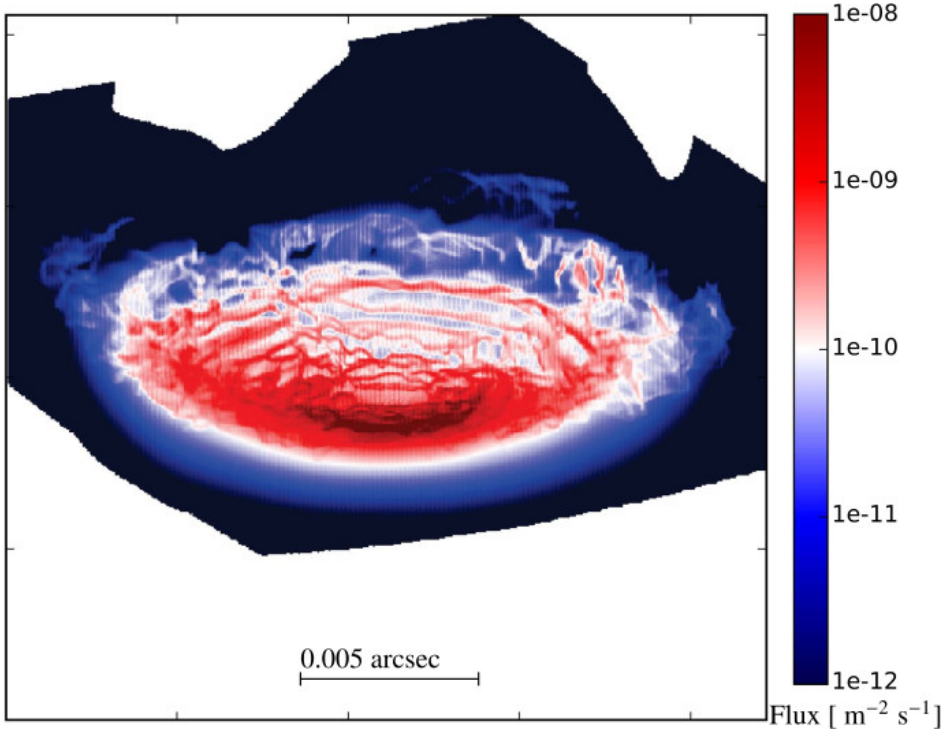
Collinding Stellar Winds

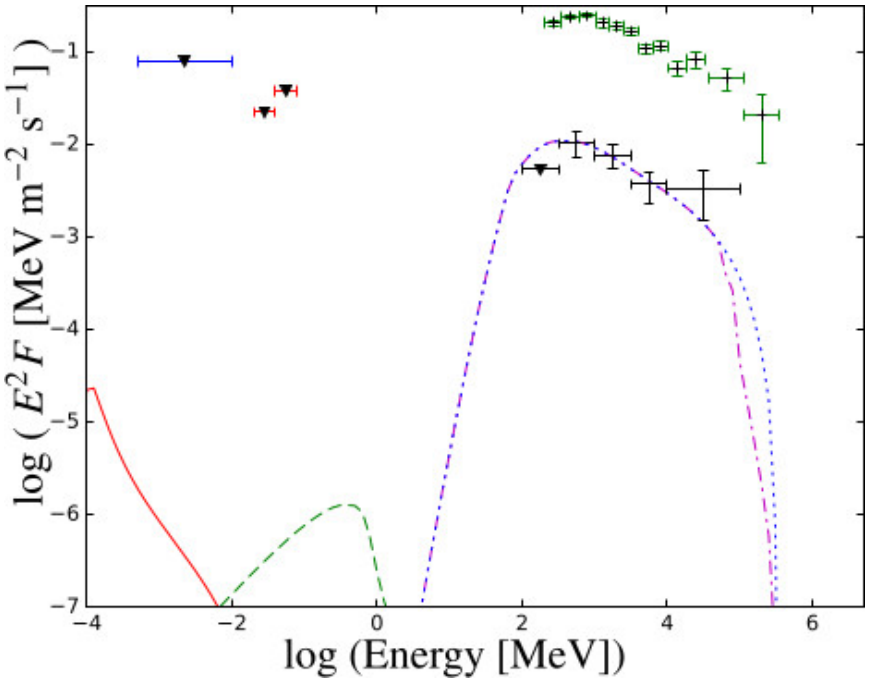
Inclu

Gamma-Ray Emission

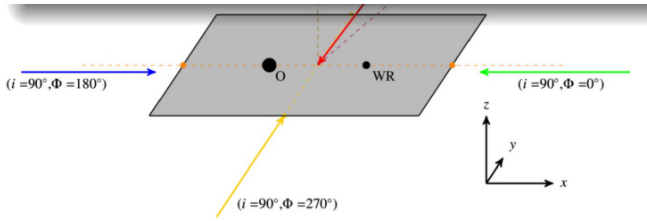


(Reitberger et al. (2017))

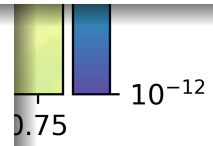
Gamma-Ray Spectrum



(Reitberger et al. (2017))



(Reitberger et al. (2017))



(Huber (2020))

Gamma-Ray Emitting Binary Systems

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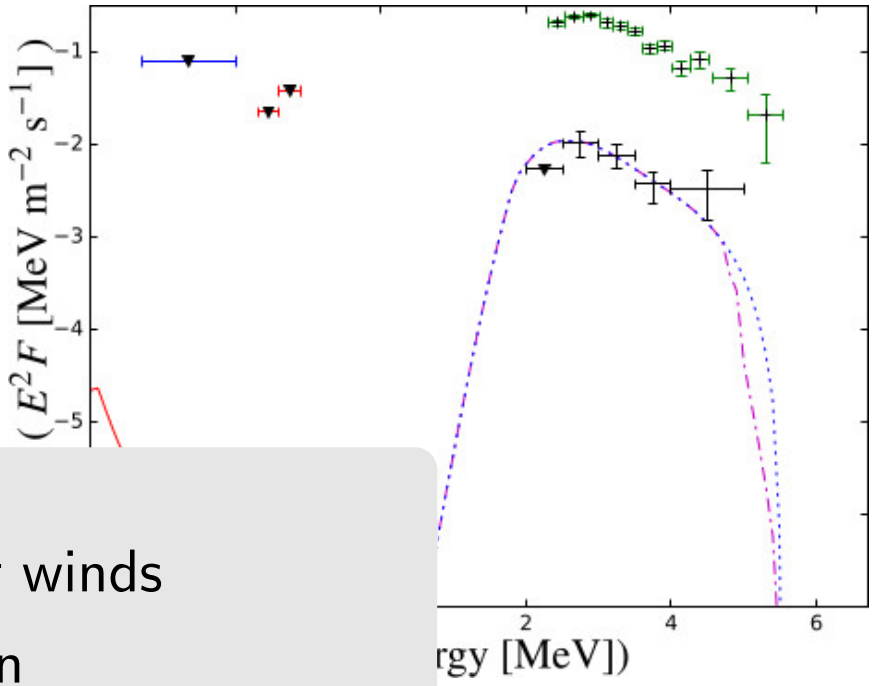
Collinding Stellar Winds

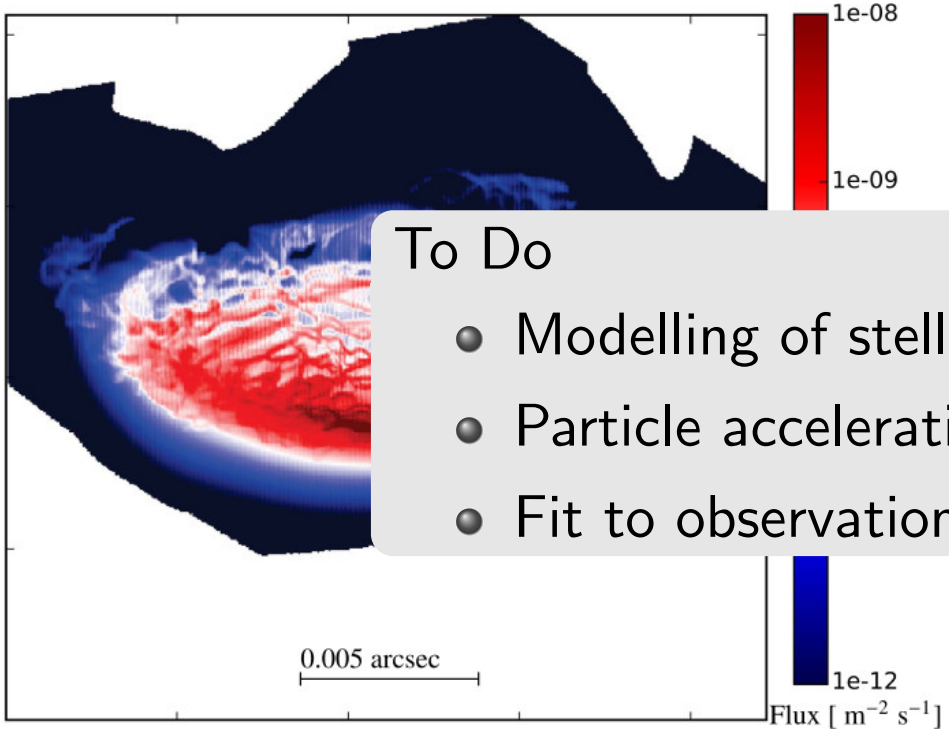
Inclu

Gamma-Ray Spectrum



(Reitberger et al. (2017))

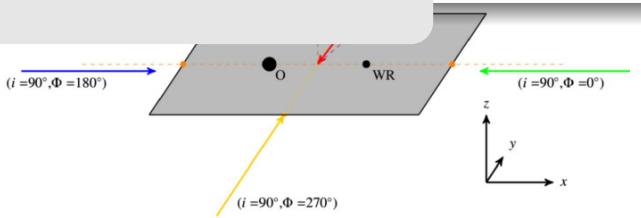
Gamma-Ray Emission



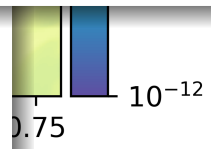
(Reitberger et al. (2017))

To Do

- Modelling of stellar winds
- Particle acceleration
- Fit to observations



(Reitberger et al. (2017))



(Huber (2020))

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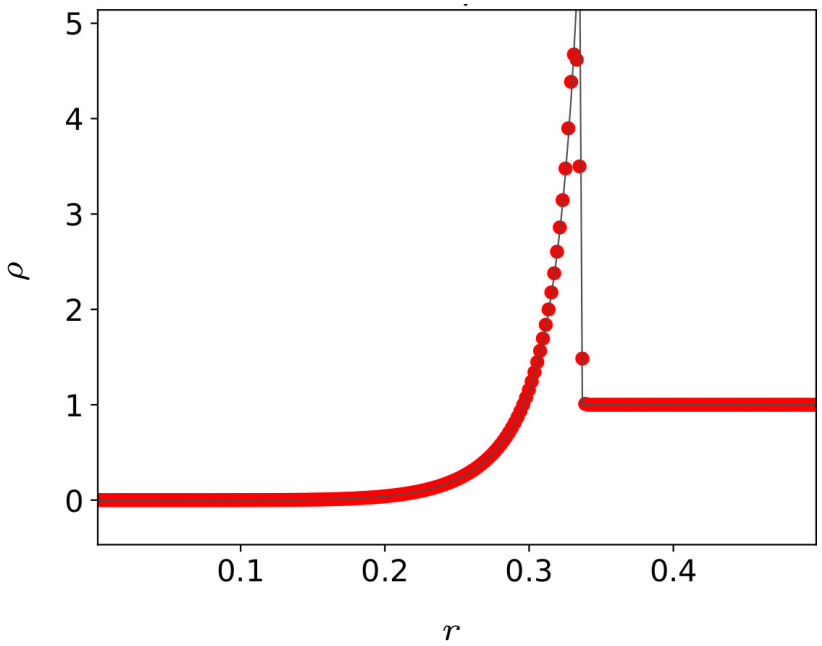
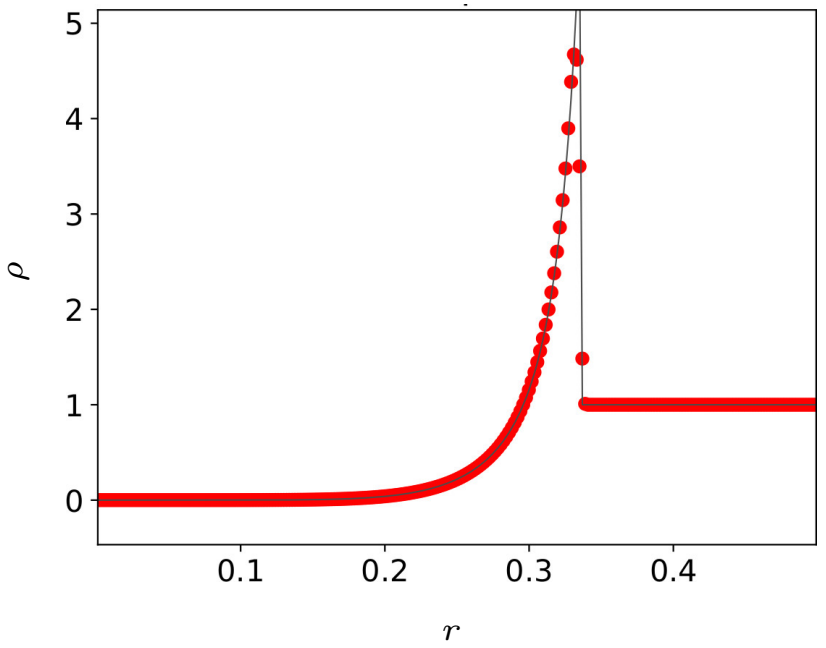
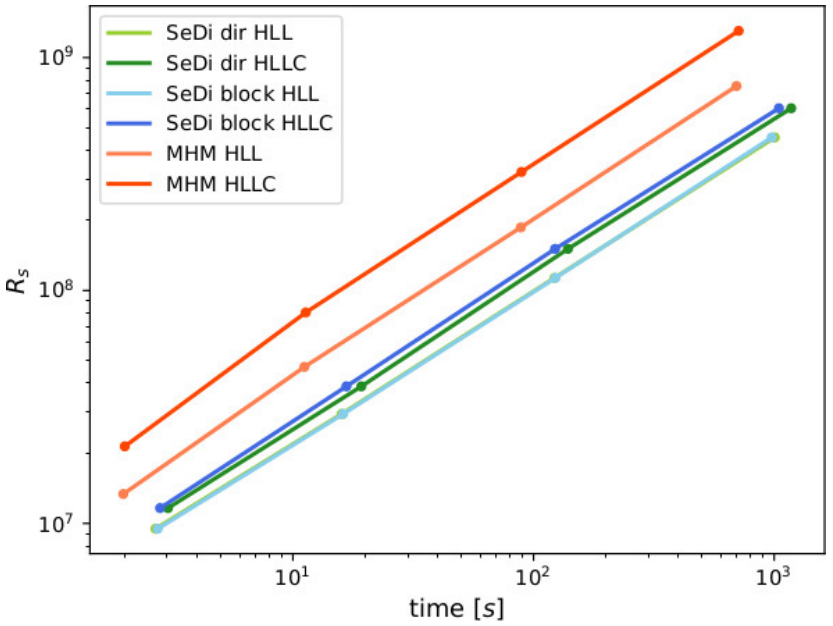
Accuracy of Numerical Solvers



Accuracy of Numerical Solvers



Efficiency of Numerical Solvers



(Knosp (2019))

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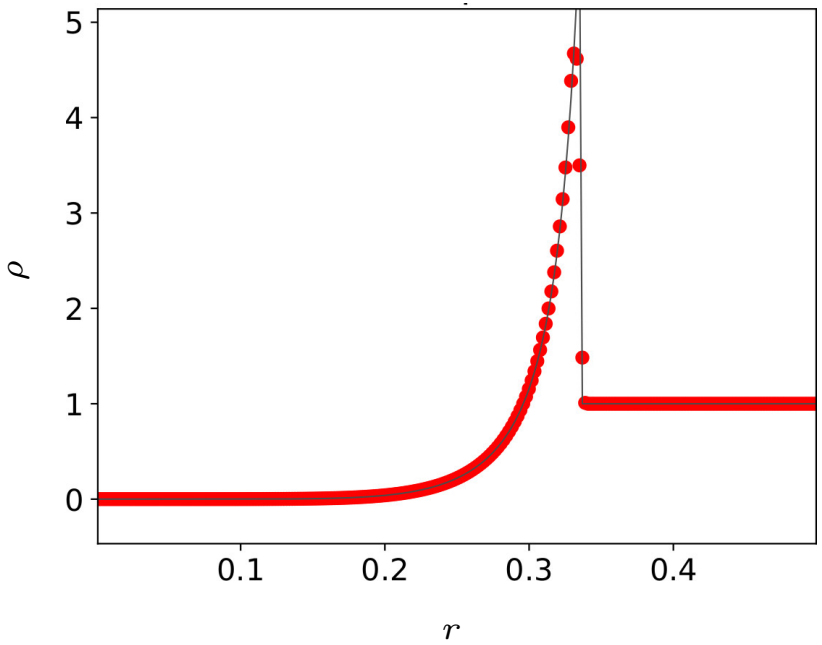
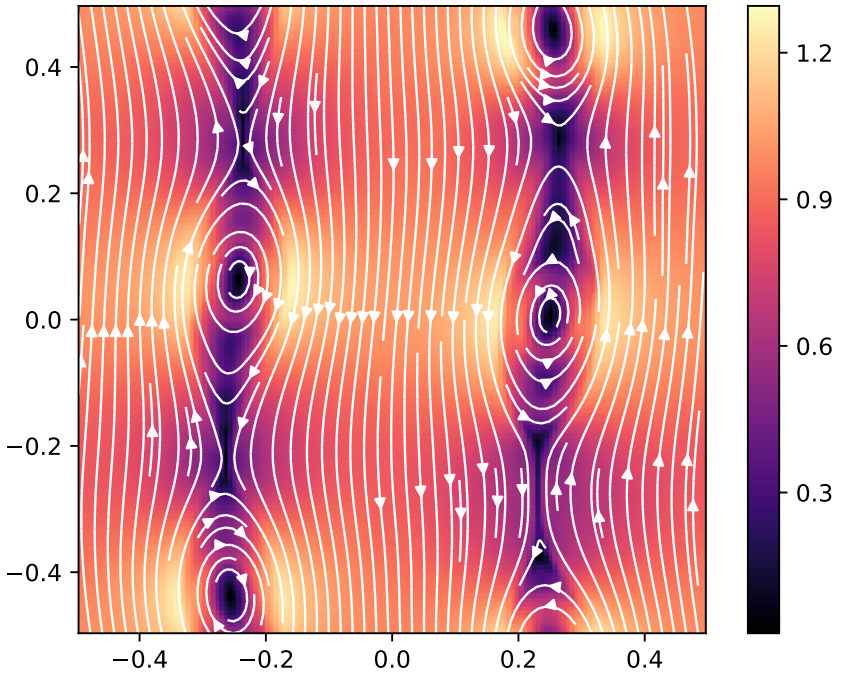
Accuracy of Numerical Solvers



Complex Numerical Tests



(Kissmann et al. (2018))

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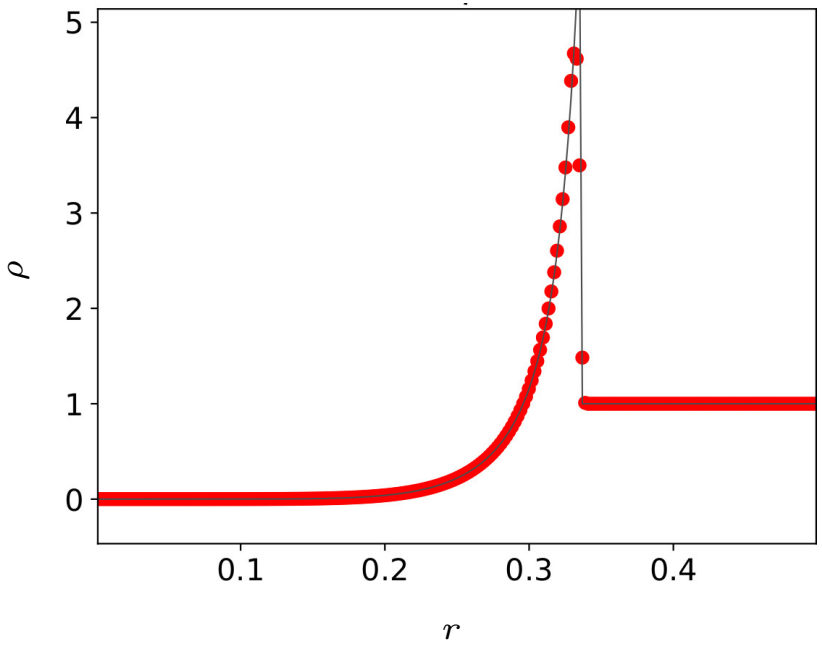
Accuracy of Numerical Solvers



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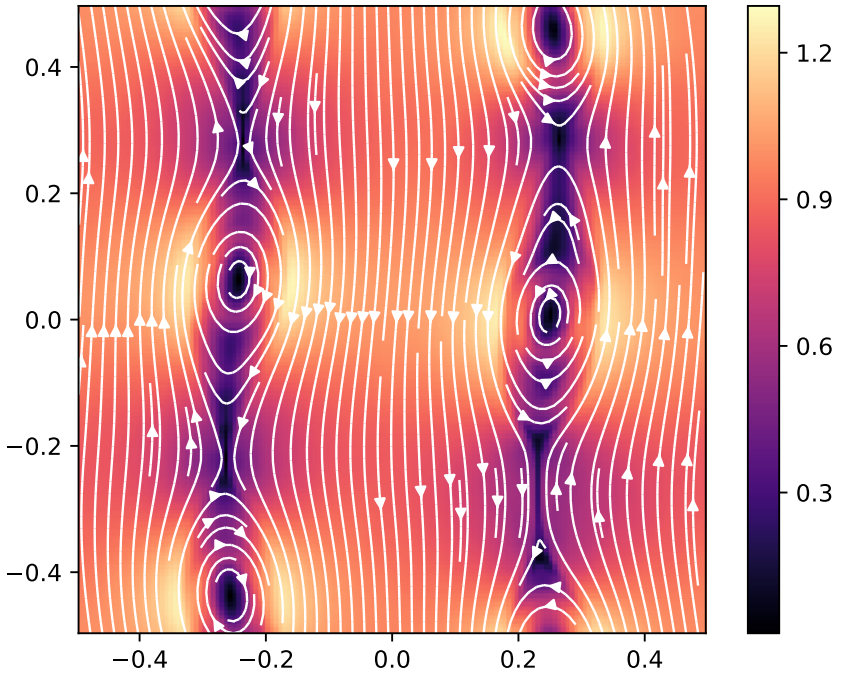
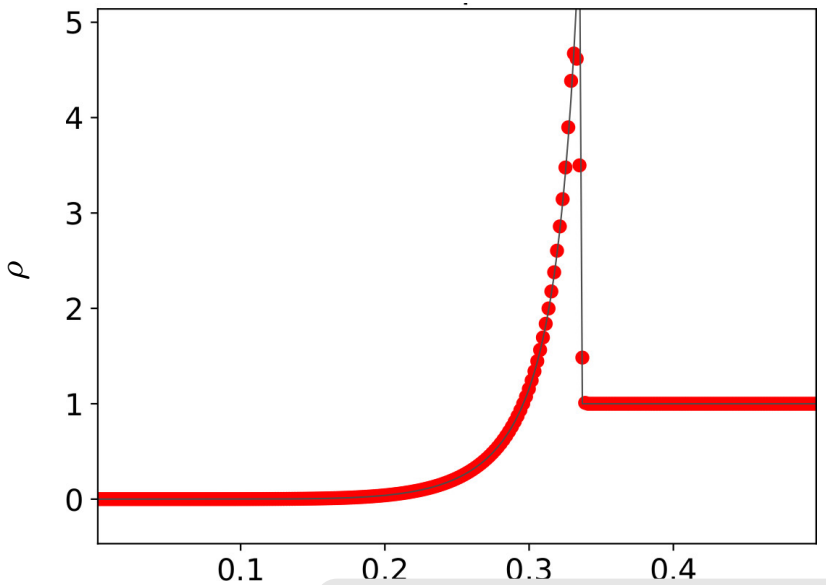


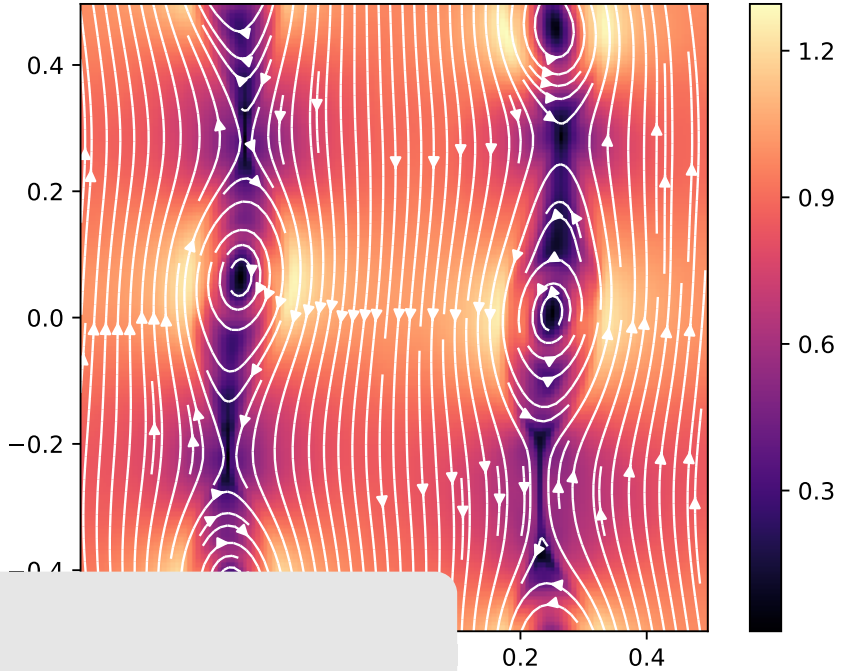
(Kissmann et al. (2018))

Field 3: Numerical Methods

Accuracy of Numerical Solvers



Complex Numerical Tests



(Kissmann et al. (2018))

To Do

- New numerical methods
- Optimising numerical schemes
- Verification of codes