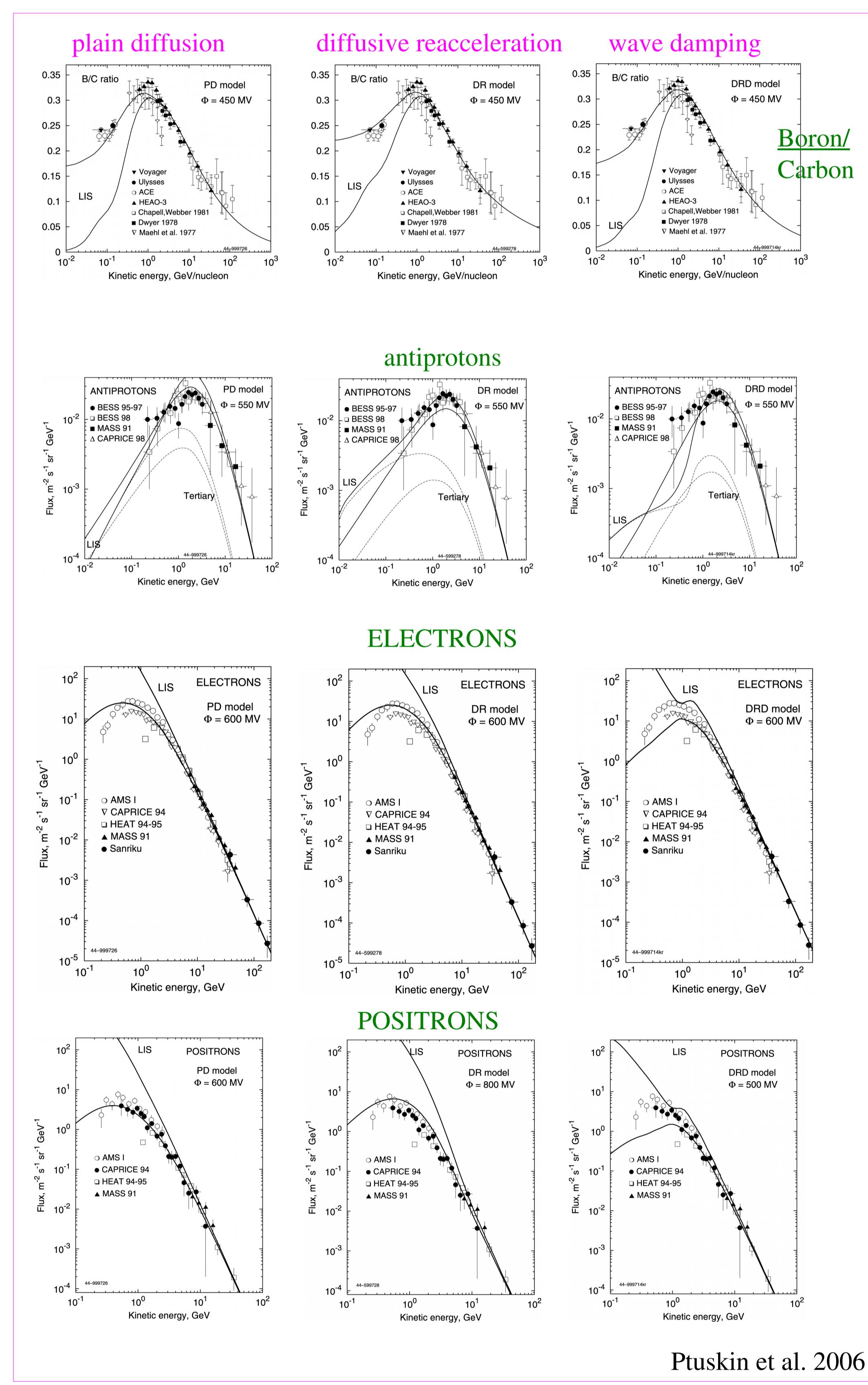
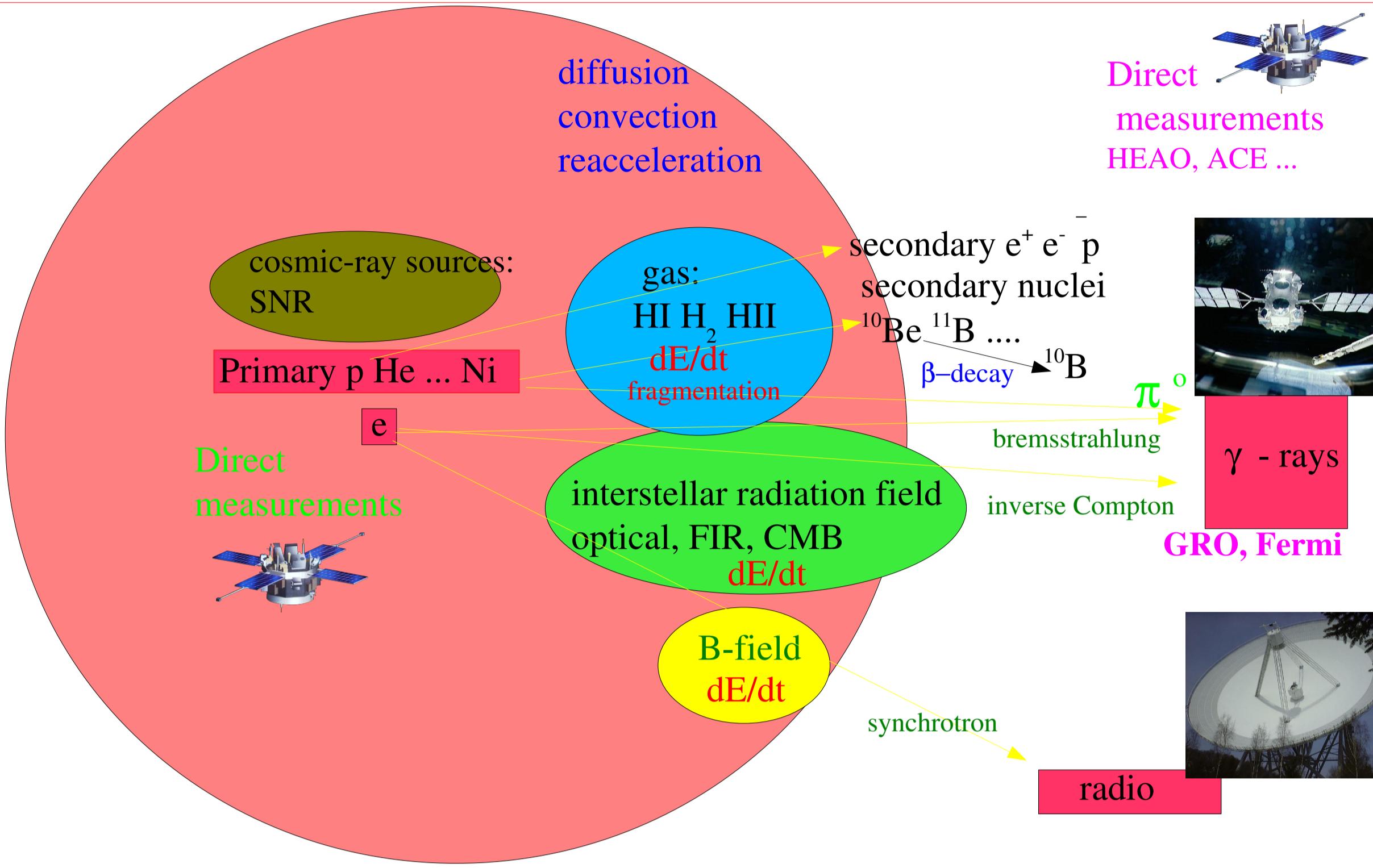
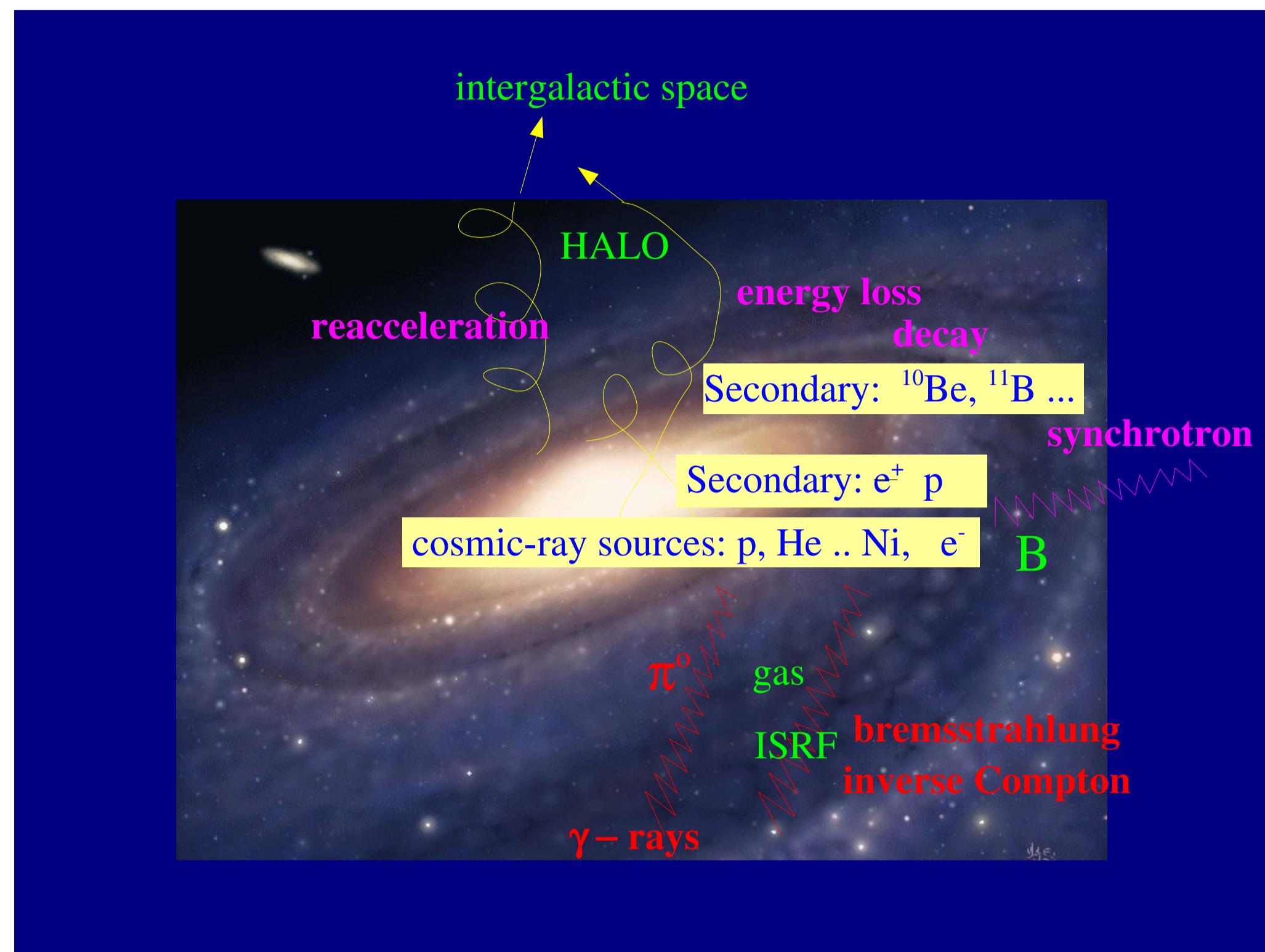
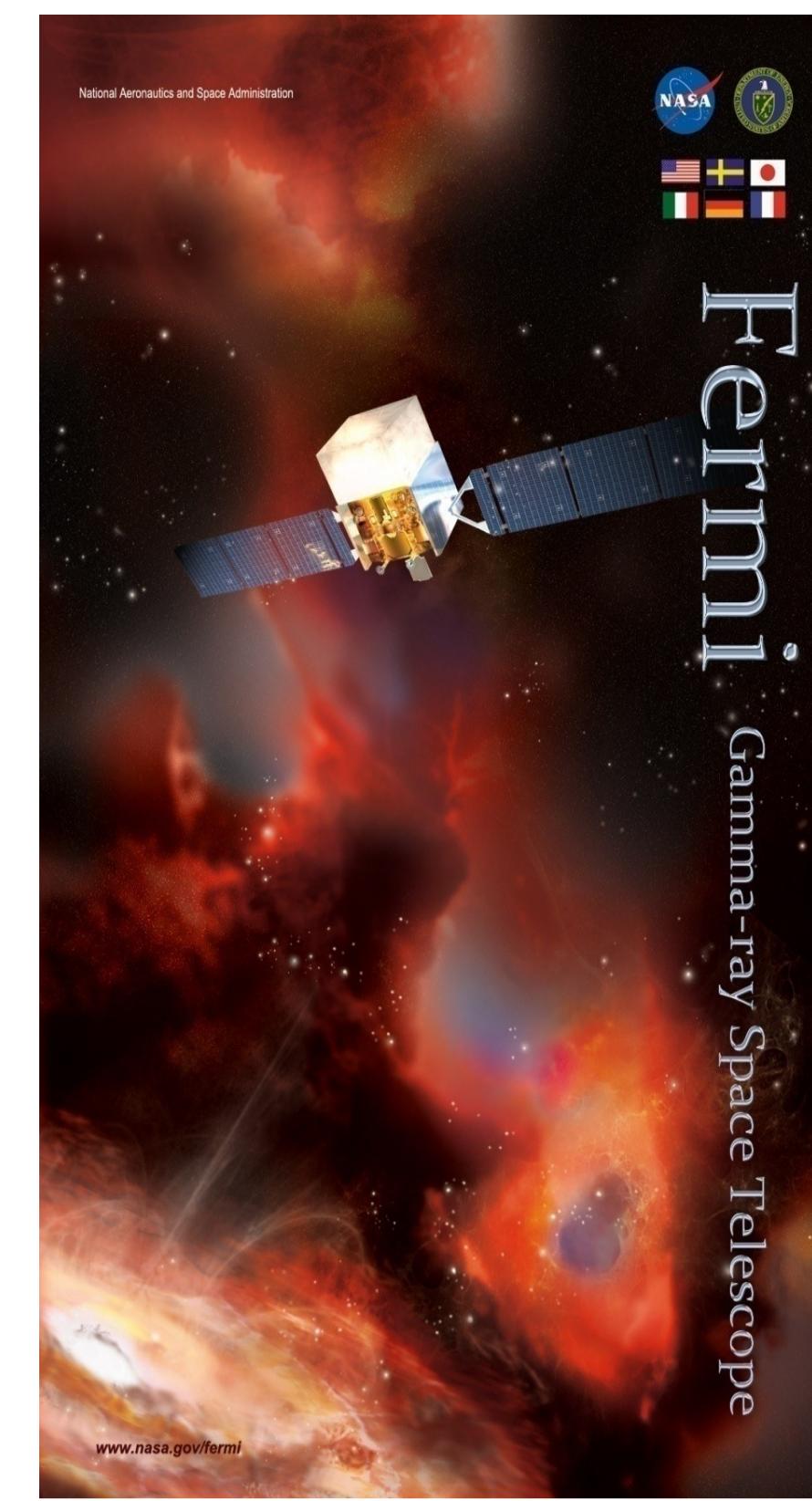


GALPROP modelling of the high-energy Galaxy

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on behalf of the Fermi Large Area Telescope Collaboration

The quality of data from the Fermi Large Area Telescope on the emission from the Galaxy requires support from a correspondingly detailed physical model. The GALPROP model has been developed over the last decade to make predictions of cosmic-propagation and the resulting interstellar emission for gamma rays and synchrotron radiation. It has been adopted in the Fermi collaboration as the basis for the physical interpretation of the Galactic emission. A new release of GALPROP is planned to correspond to results presented at this Symposium. We describe this release and its new features, and illustrate with comparisons with a range of data including Fermi gamma-ray and electron results.



Cosmic-ray propagation

$$\frac{\partial \psi(r, p)}{\partial t} = q(r, p)$$

cosmic-ray sources (primary and secondary)

$$+ \nabla \cdot (D_{xx} \nabla \psi - v \psi)$$

diffusion convection

$$+ \frac{\partial}{\partial p} [p^2 D_{pp} \frac{\partial \psi}{\partial p} / p^2]$$

diffusive reacceleration (diffusion in p)

$$- \frac{\partial}{\partial p} [dp/dt \psi] - p/3 (\nabla \cdot v) \psi$$

momentum loss adiabatic momentum loss

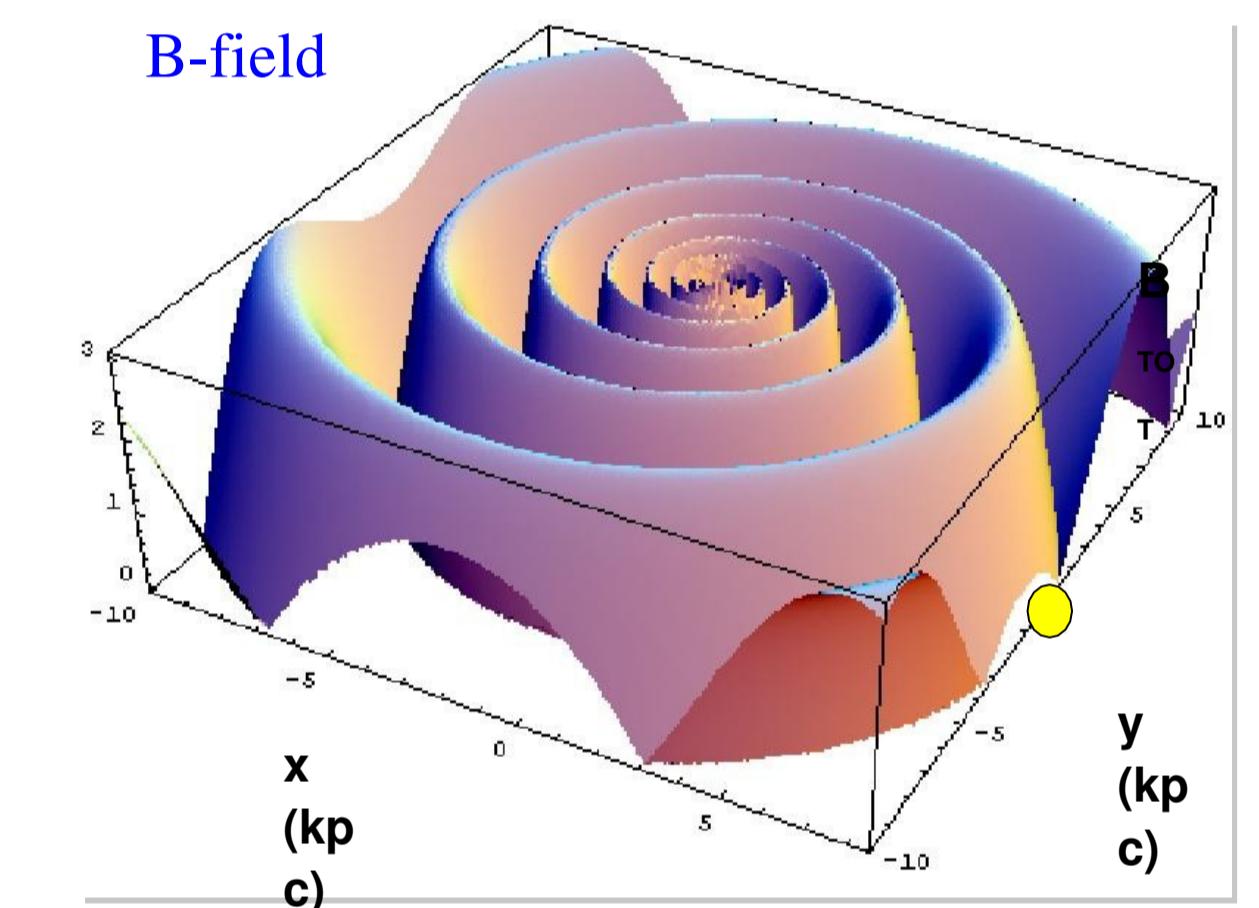
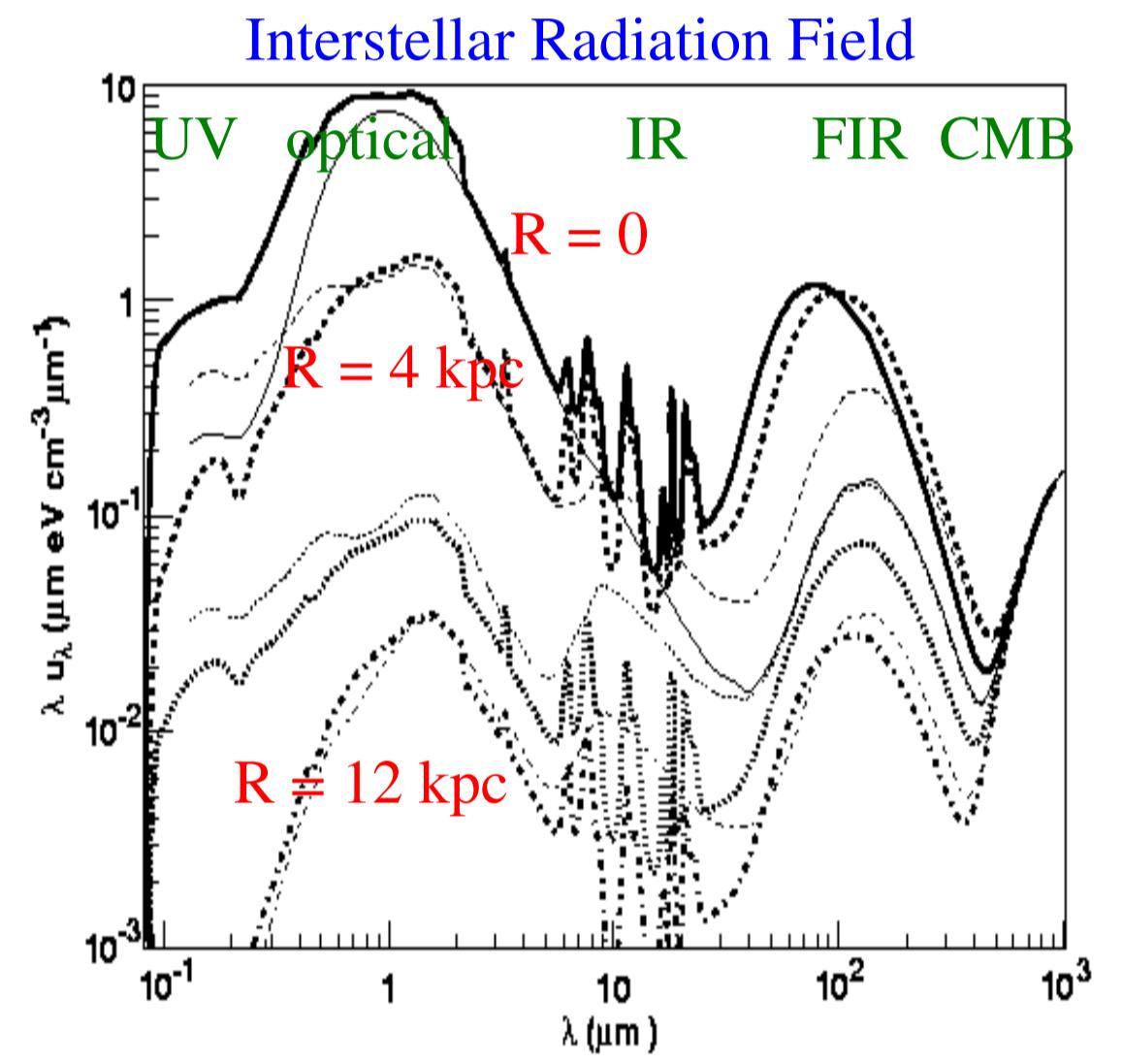
$$- \psi/\tau_f$$

ionization, bremsstrahlung

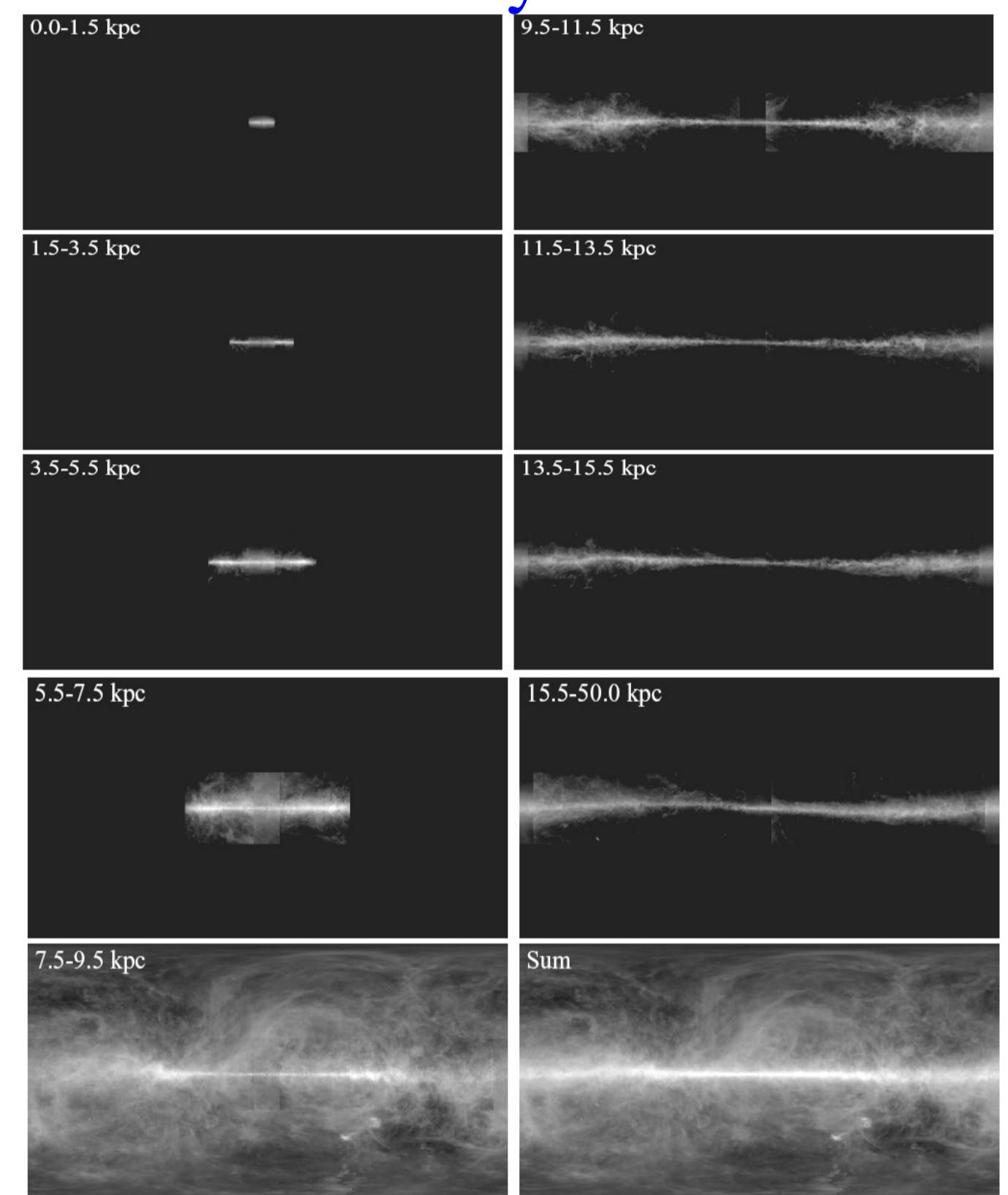
$$- \psi/\tau_r$$

nuclear fragmentation

radioactive decay



Gas Surveys: HI



GALPROP is a public code, last release was 2004
New Release: planned for this year.

see GALPROP website: <http://galprop.stanford.edu>
for code, user forum and more.

New features include :

- new interstellar radiation field using FraNKIE code
- new HI and CO gas surveys
- Healpix gamma-ray skymaps, Fermi-LAT compatible skymaps
- gamma-ray skymaps in Galactocentric rings
- 3D models of Galactic magnetic field
- synchrotron computed using regular and random B-fields
- inverse Compton scattering on anisotropic radiation field
- parallel processing support, memory optimization



Spectrum of inner Galaxy

300° < l < 60°, |b| < 10°

galdef ID 54_77KephTS

0.25<phi<0.25, 0.25<rho<1.75

4.75<phi<4.25, 0.25<rho<1.75

408 MHz

405 MHz

475 MHz

490 MHz

500 MHz

515 MHz

530 MHz

545 MHz

560 MHz

575 MHz

590 MHz

605 MHz

620 MHz

635 MHz

650 MHz

665 MHz

680 MHz

695 MHz

710 MHz

725 MHz

740 MHz

755 MHz

770 MHz

785 MHz

800 MHz

815 MHz

830 MHz

845 MHz

860 MHz

875 MHz

890 MHz

905 MHz

920 MHz

935 MHz

950 MHz

965 MHz

980 MHz

1000 MHz

1015 MHz

1030 MHz

1045 MHz

1060 MHz

1075 MHz

1090 MHz

1105 MHz

1120 MHz

1135 MHz

1150 MHz

1165 MHz

1180 MHz

1200 MHz

1220 MHz

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1880 MHz

1900 MHz

1920 MHz

1940 MHz

1960 MHz

1980 MHz

2000 MHz

2020 MHz

2040 MHz

2060 MHz

2080 MHz

2100 MHz

2120 MHz

2140 MHz

2160 MHz

2180 MHz

2200 MHz

2220 MHz

2240 MHz

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