

## Implications for cosmic rays and magnetic fields

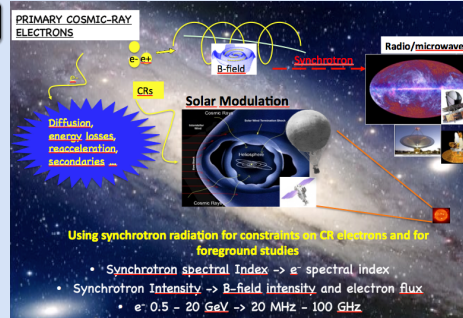
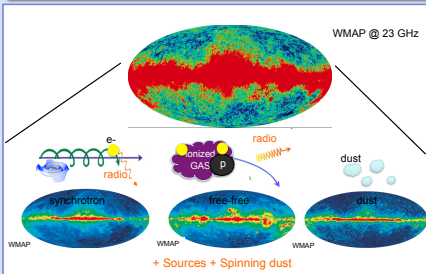
Elena Orlando (Stanford University/KIPAC) and Andrew Strong (MPE)

### ABSTRACT

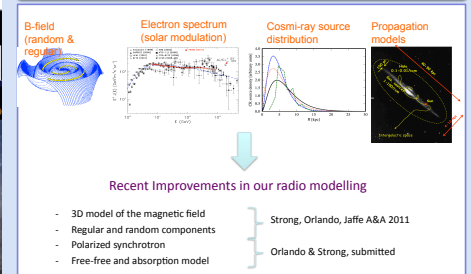
Interstellar synchrotron emission depends on Galactic magnetic fields and on the cosmic-ray electron spectrum and distribution in the Galaxy. This emission is one of the major diffuse Galactic components from radio to microwave and it is a source of foreground for cosmic microwave background observations.

In this work we present the latest developments in our modeling of Galactic radio emission. We use the latest improvements of the GALPROP code in this band, including polarization. Relevant observables include spectra and radio maps. Using surveys over a wide range of radio frequencies and polarization measurements, we derive constraints on the low-energy interstellar cosmic-ray electron spectrum, magnetic fields and propagation models. Cosmic-ray source distributions and Galactic halo size are also investigated. Our predictions will be useful for multi-wavelength studies including gamma rays observed by Fermi-LAT.

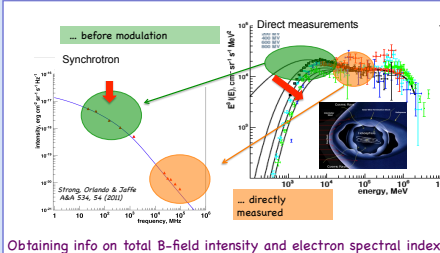
### The microwave sky



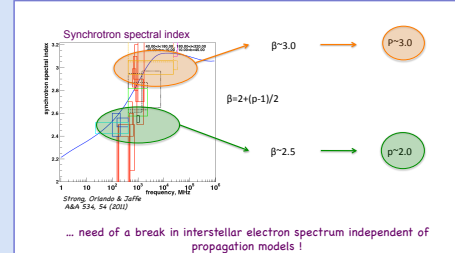
### Modeling synchrotron emission



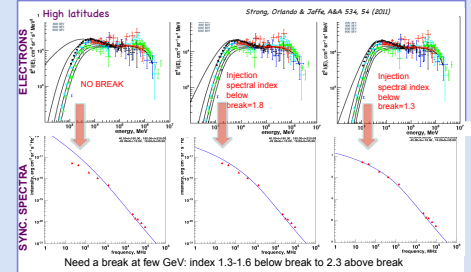
### Probing Interstellar electron spectrum I



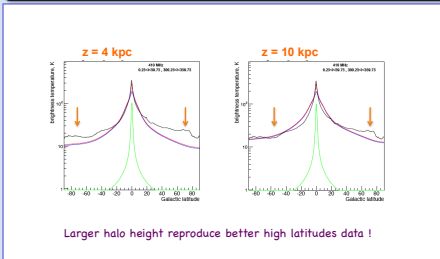
### Probing Interstellar electron spectrum II



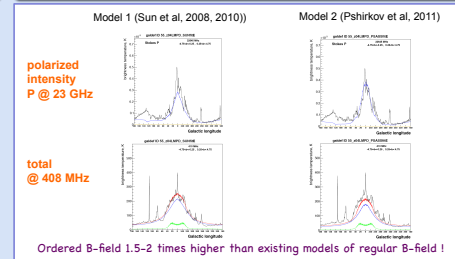
### Probing electron injection spectrum



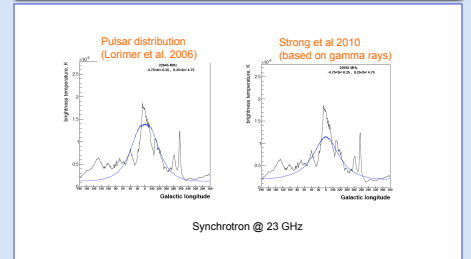
### Sensitivity to halo height z



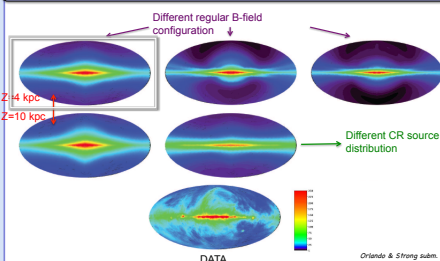
### Sensitivity to existing B-field models



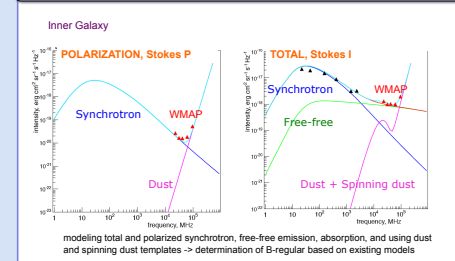
### Sensitivity to cosmic-ray source distribution



### 408 MHz



### Including all components



### Polarization skymaps @ 23 GHz

