

A multichannel picture of the Sun at high energies

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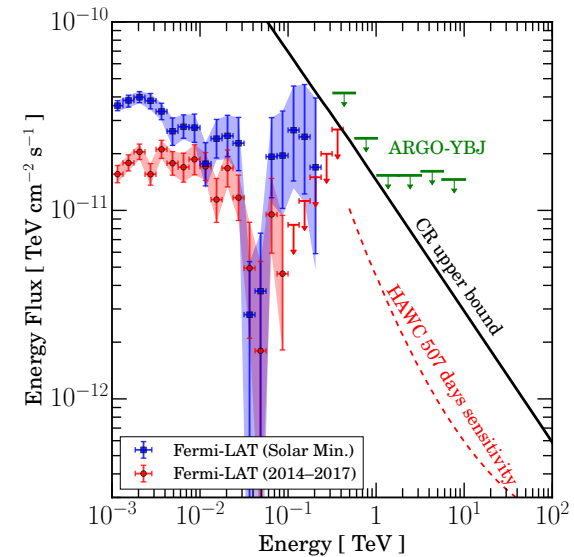
Gutiérrez, M. & Masip, M. 2020, *Astroparticle Physics*, 119, 102440,
doi:10.1016/j.astropartphys.2020.102440

M. Gutiérrez, M. Masip, S. Muñoz *The solar disk at high energies* [in preparation].

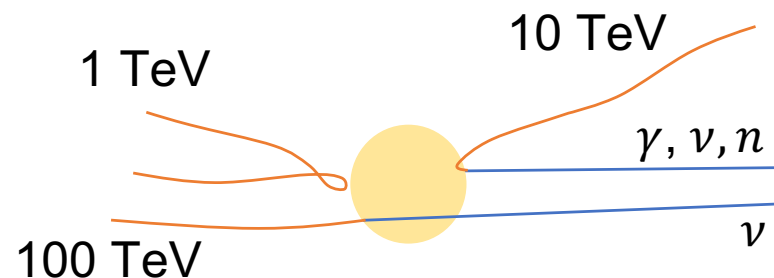
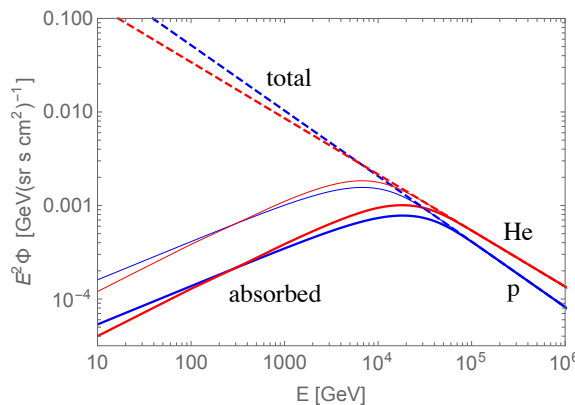
What to expect when looking at the Sun?

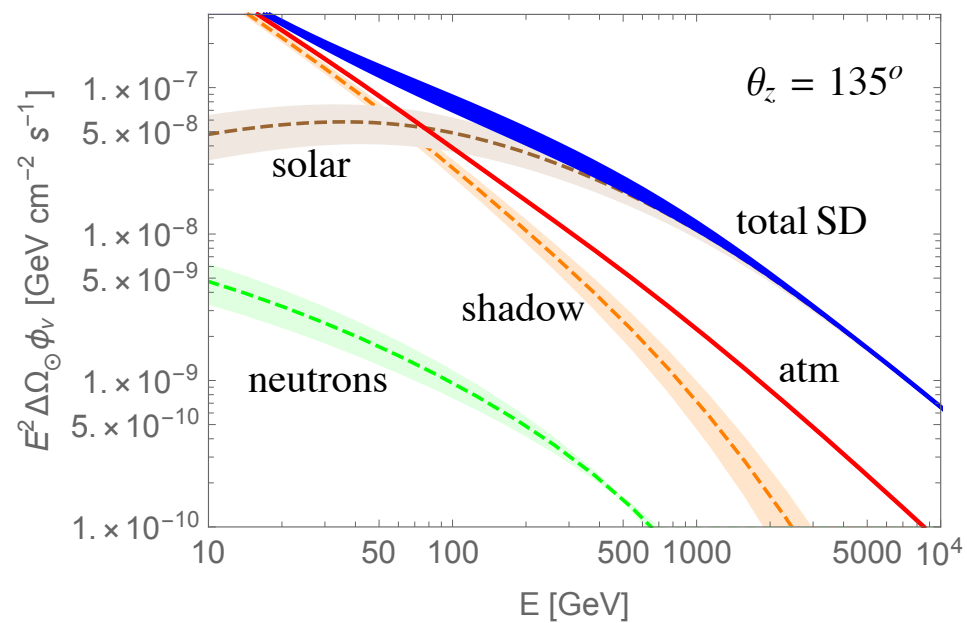
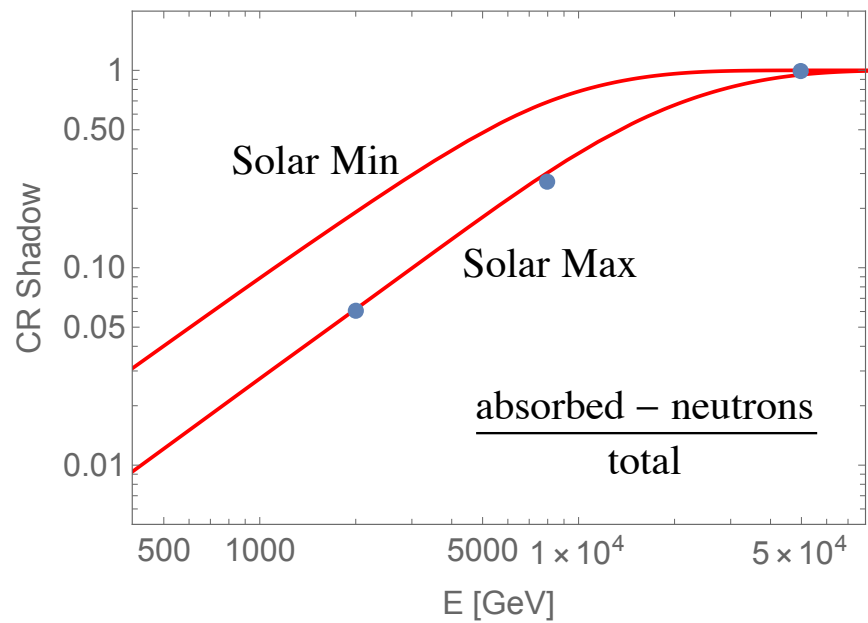
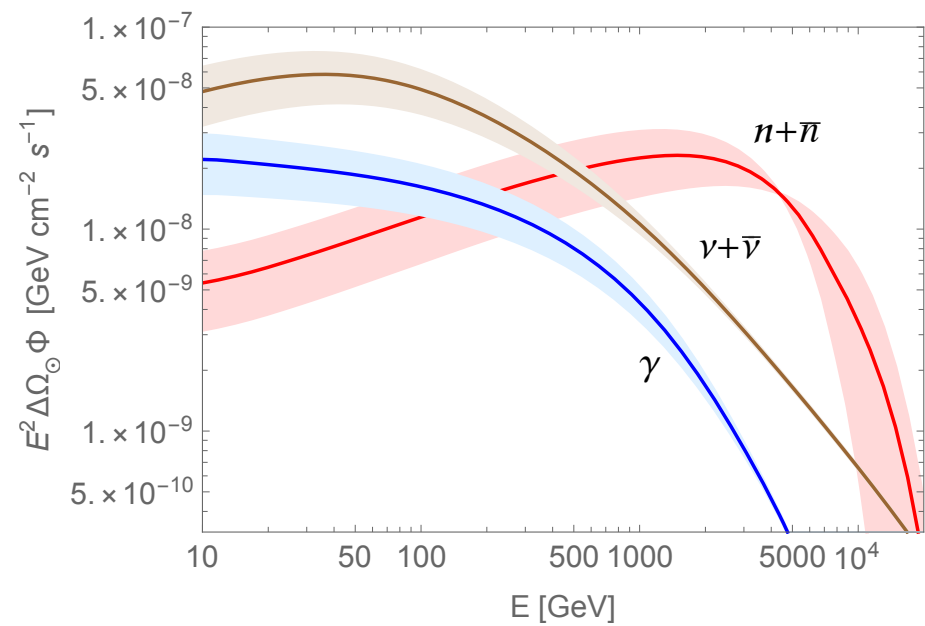
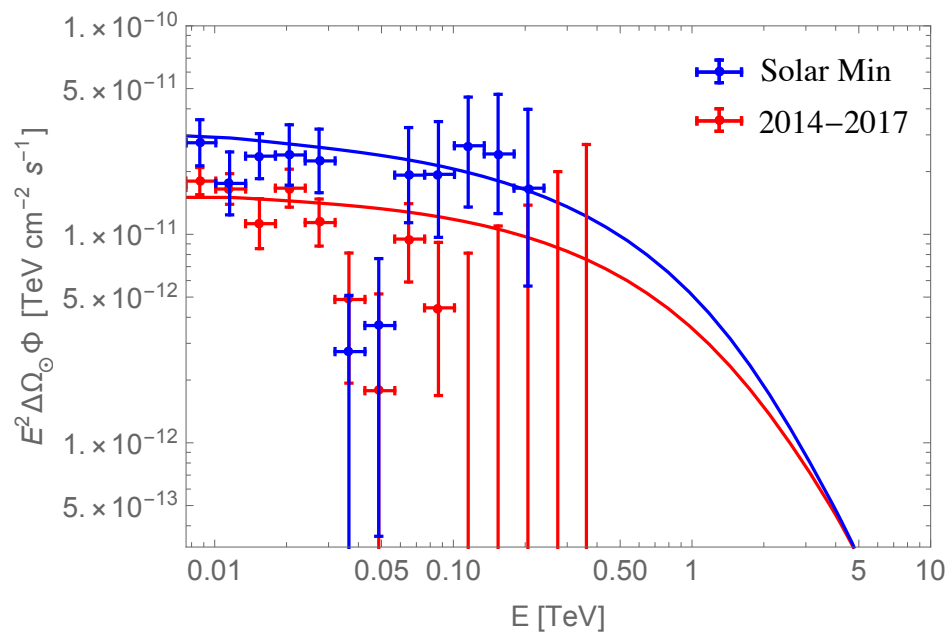
• To model the fluxes coming from the Sun we can use the two following observations:

1. The albedo flux of γ rays observed at **Fermi-LAT**: Sustained flux that extends **up to 200 GeV**.



2. The energy-dependent CR shadow of the Sun at **HAWC**: If integrated, it accounts for **6% of a black disk at 2 TeV**, **27% at 8 TeV** and **100% at 50 TeV**





Summary

- The Sun may be observed in several channels that are in fact correlated:
 1. A **gamma flux** observed by Fermi-LAT.
 2. A **neutrino flux**.
 3. A **cosmic ray shadow** measured by HAWC.
 4. A **neutron flux** (not observed because there are not hadronic calorimeters in the space). However, this flux also contributes to the neutrino flux and the CR shadow.
 5. The CR shadow implies a signal in neutrino telescopes: a muon shadow of the Sun.
- It's important to understand these fluxes because they provide information about the Sun.
- The neutrino flux is a **background** for solar DM searches!

Thanks for your attention!