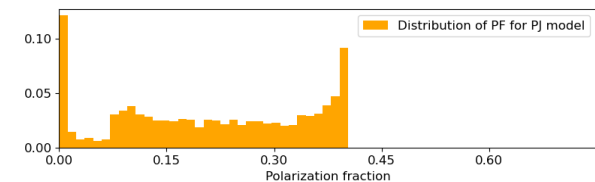
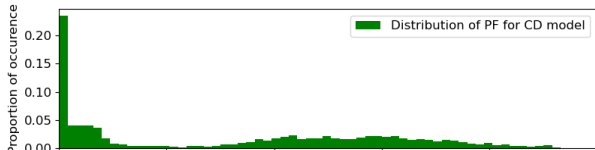
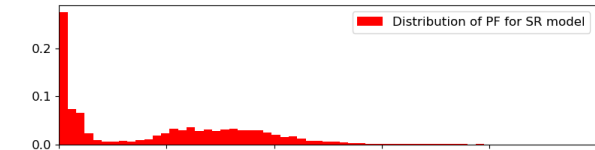
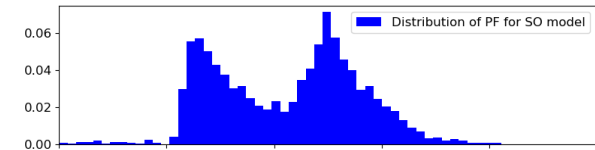


Distribution of Polarization fraction



### Polarisation fraction expected for different models of GRBs :

- Monte Carlo simulations
- 4 emission models implemented for a simplified jet so far



### Prototype of compton telescope COMCUBE :

- Test of a prototype of gamma telescope with a stratospheric balloon flight :
  - Test in Timmins (Canada)
  - Altitude : 36km
  - Duration : 8h
- Objectives :
  - Preparing a transatlantic stratospheric balloon flight
  - Testing the prototype with high altitude conditions

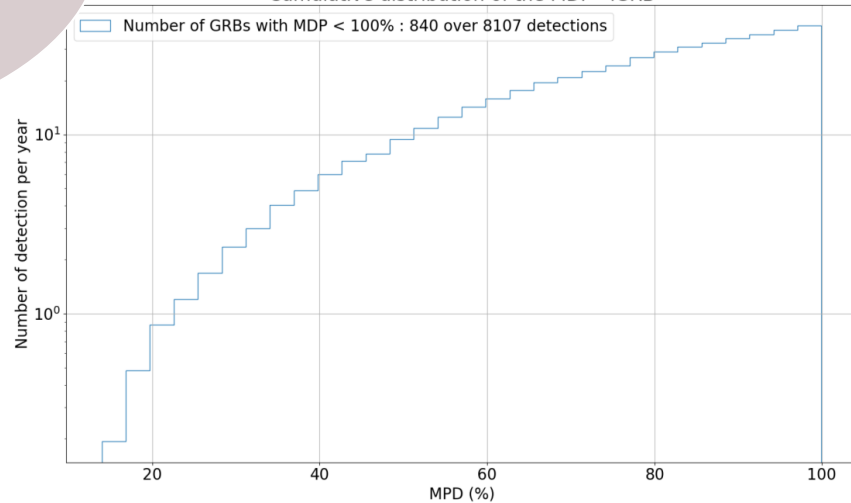
## GRB polarimetry with a CubeSat mission : COMCUBE

Nathan Franel, IJCLab  
Supervisors:  
Vincent Tatischeff  
Clarisse Hamadache

### Simulating GRBs and the instrument response :

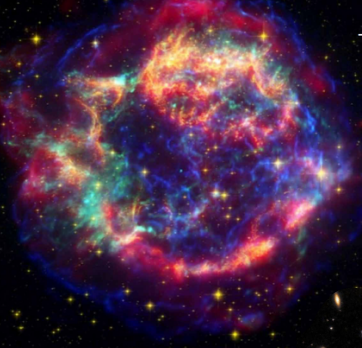
- Sensibility to polarisation : Minimum polarisation detectable
  - Should detect 2 GRBs with a polarisation of at least 30% or 9 with a polarisation of at least 50% (for a 3 CubeSats constellation)

Cumulative distribution of the MDP - IGRB



# Origin of galactic cosmic rays of energies up to the PeV: the Pevatrons

2<sup>nd</sup> year of PhD: Dubos Coline – Supervisor: Pr. Tiina Suomijärvi



RX J1713.7-3946

**Supernova Remnant**



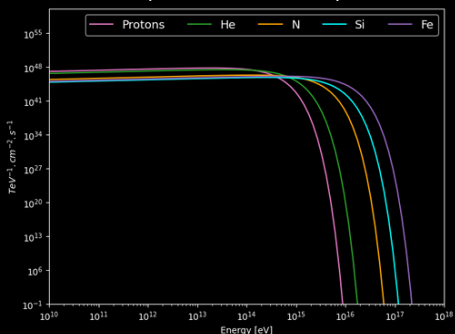
Interstellar medium

Protons

Are protons and **heavier nuclei** accelerated efficiently by **SNRs**?

Particle spectrum

Cosmic-ray energy spectrum and composition up to the ankle (Thoudam et al.)



Particle distribution

Abundances of GCRs

$$f(E) = f \cdot \sigma \cdot A_p \cdot (E/E_0)^{-\alpha} \cdot e^{-\frac{E}{Z \cdot E_c} \cdot \frac{1}{A} \cdot \beta}$$

Cross section



Can we see **cosmic rays** from **SNRs** by measuring **γs** with **CTA**?

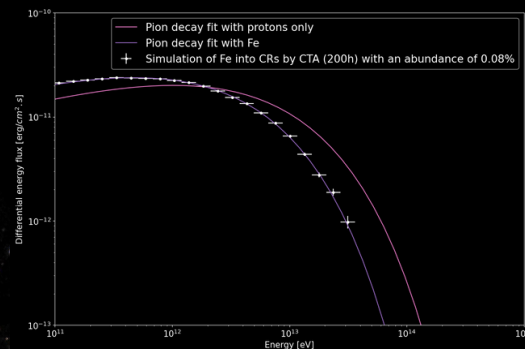
Simulation for CTA

IRF - prod5 v0.1

Pion decay models - Naima (Gammapy)

**Fixed parameters**

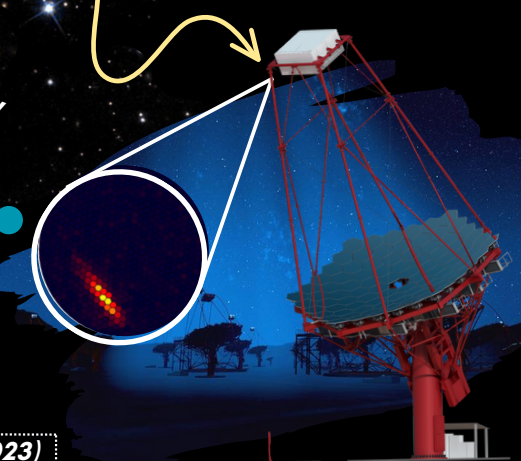
Fits - TS (Fe-P)  $\approx$  6755



**CTA is sensitive to CRs composition!**

Cherenkov Telescope Array

20 GeV-300 TeV

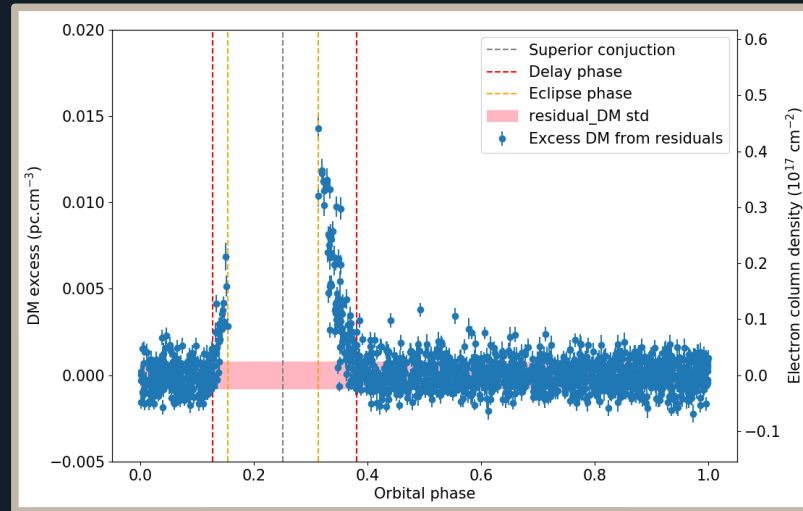


# Spider binaries with the Nançay Radio Telescope

Clara Blanchard  
LPC2E, Univ. Orléans

Pair of pulsar + non  
degenerate companion :

- $P_{\text{spin}} < 20 \text{ ms}$
- $10^{-4} < M_c < 0.5 M_{\text{sun}}$
- $P_{\text{orb}} < 2 \text{ days}$



Eclipse of J2055+3829

19 spiders observed with the NRT :

→ since 2004  
→ about 1 obs every ~1.3 days,  
typically 1h long

The NRT sample enables us to  
study group properties !

Why are spiders  
interesting ?

- Timing for PTAs
- Evolution process of millisecond pulsars
- Wind interaction & high energy emission
- Neutron star properties
- Eclipse phenomenology :
  - Process
  - Conditions to see them
  - Shared characteristics
  - Link with orbital stability

# Discovery of 20 TeV $\gamma$ -ray Pulsations from the Vela Pulsar

Nature Astronomy, Sept 2023

A. Djannati-Ataï for the H.E.S.S. Collaboration  
APC, CNRS, Paris

