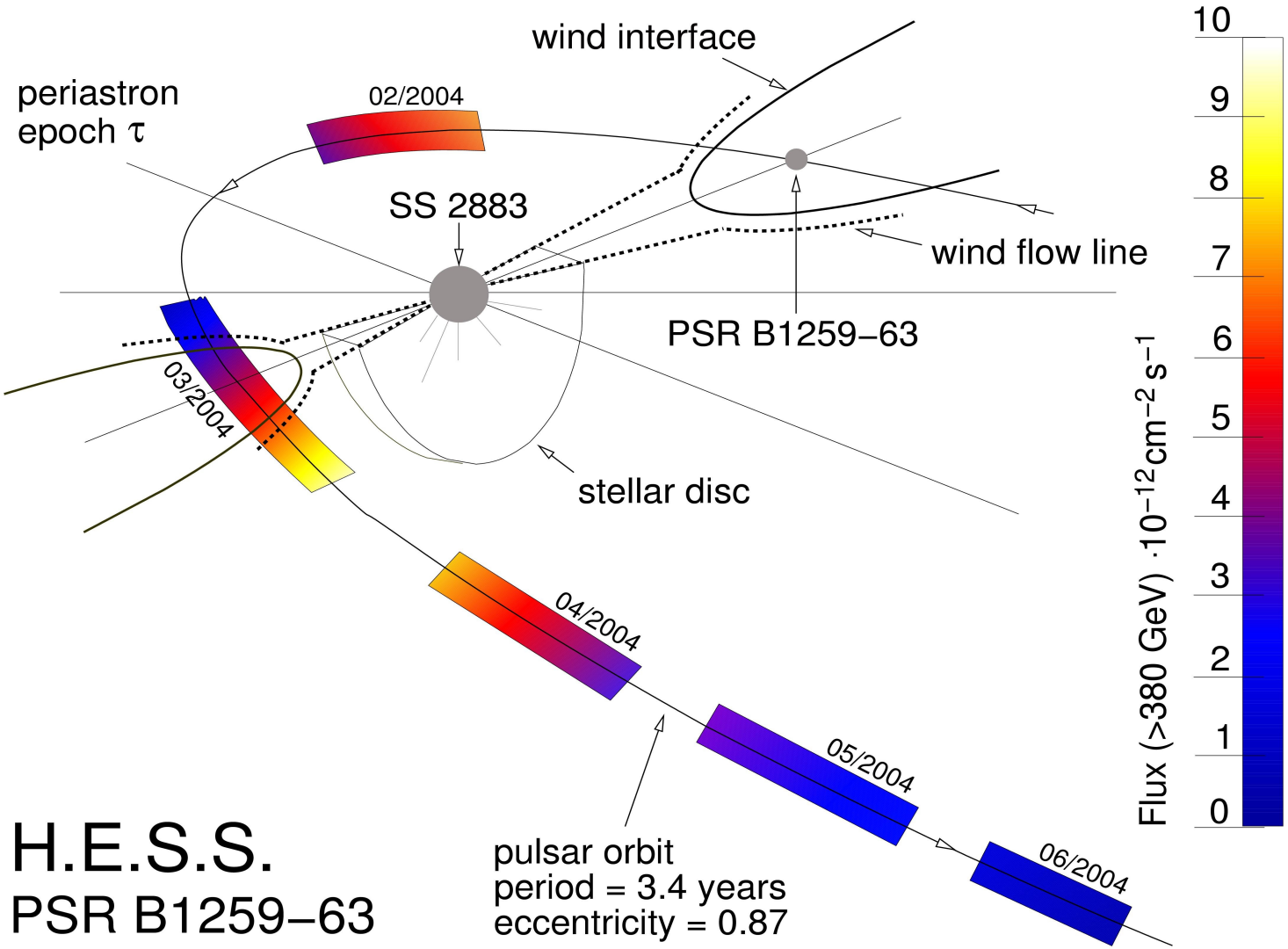
MHD flows in the binary system PSR1259-63/LS2883 and its possible impact on the gamma-ray radiation

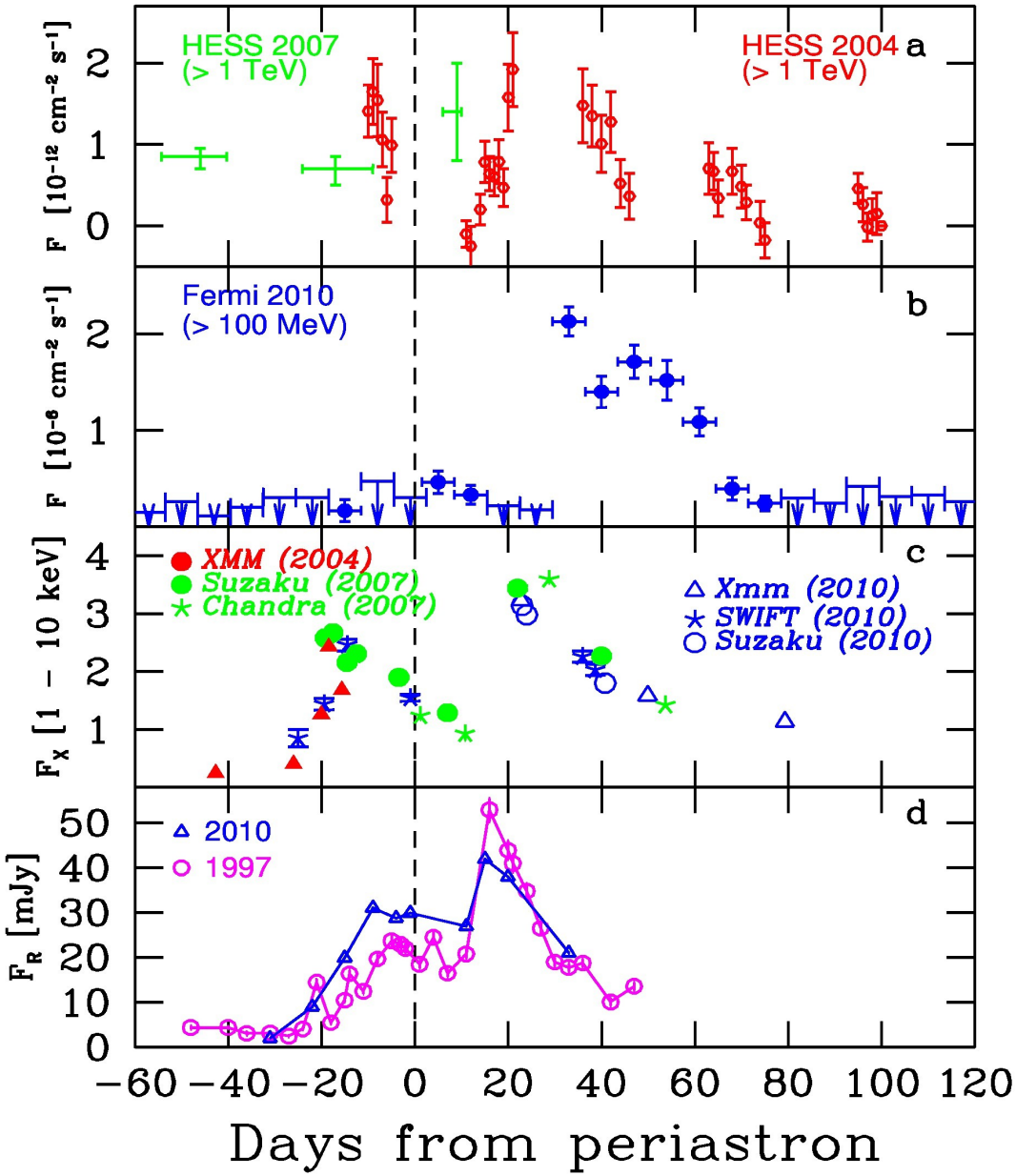
S.Bogovalov
(National research nuclear university (MEPHI)
Moscow, Russia)
D.Khangulyan (ISAS/JAXA)
F.Aharonian (DIAS, MPIK)
M.Ribo (University of Barcelona)

Binary system PSR1259-63/SL2883

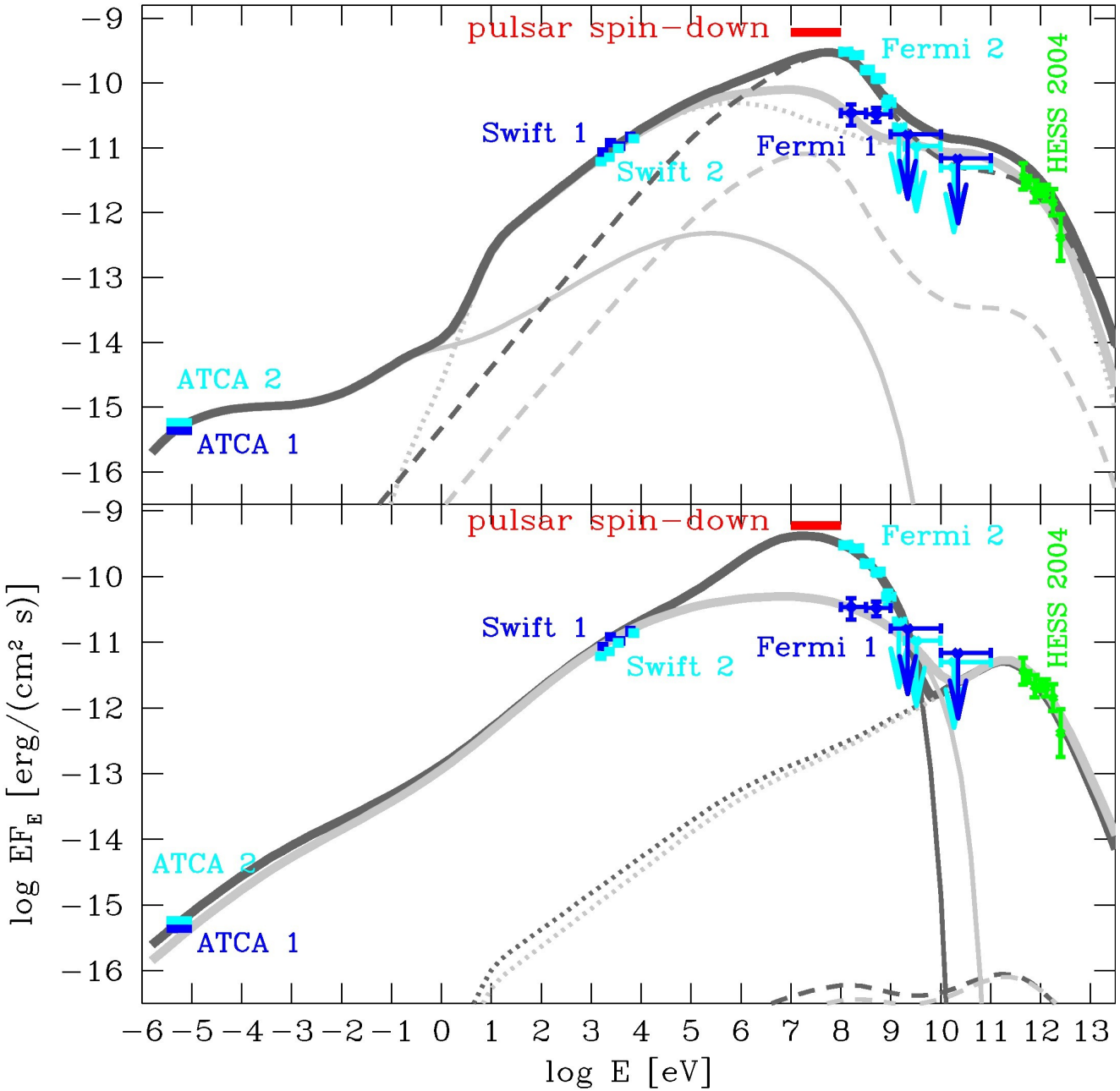


H.E.S.S.
PSR B1259–63

Light curve near periastron(Abdo et al, 2011)



Spectra (Abdo et al., 2011)



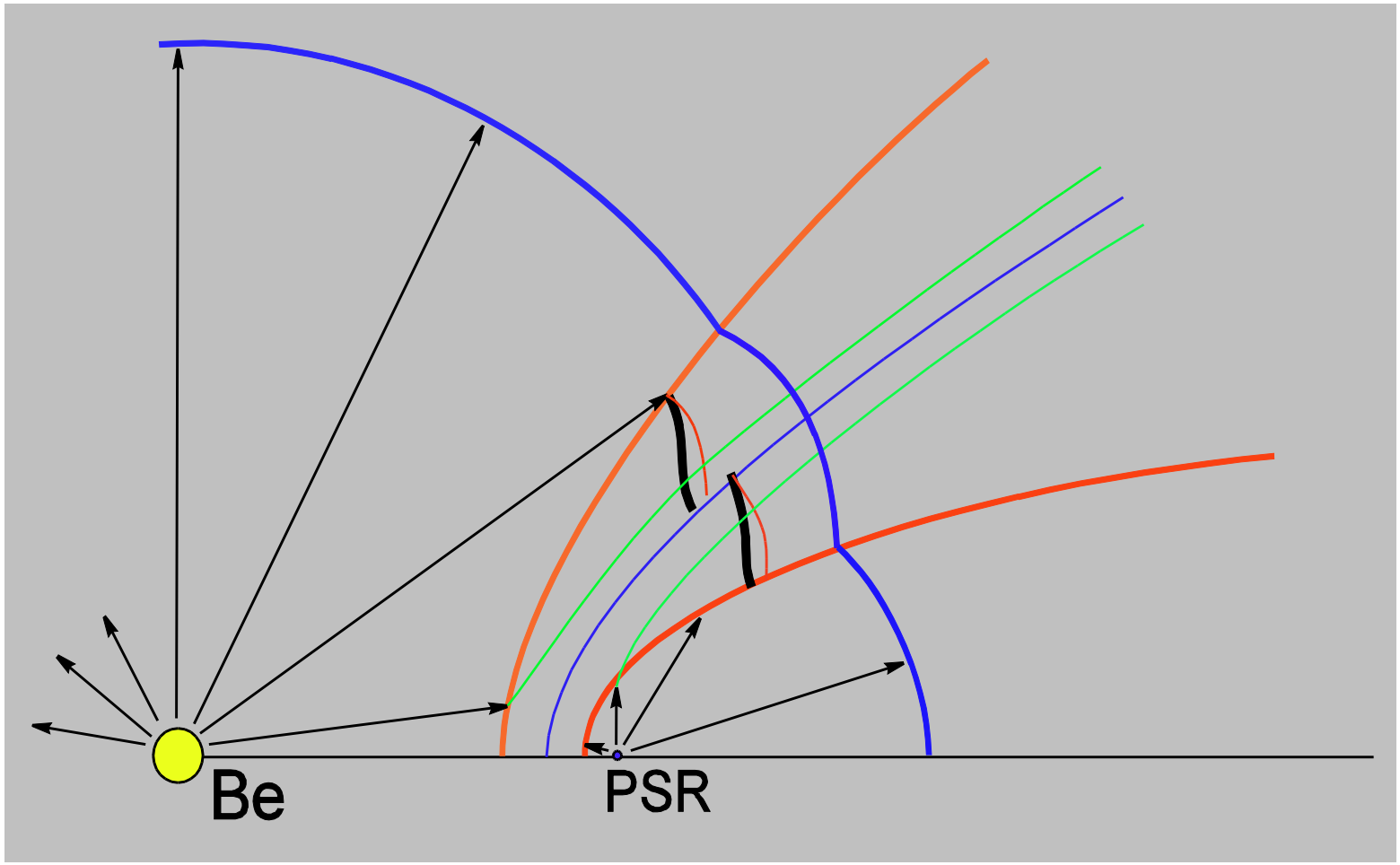
Properties of the flares above 100 MeV

1. Close coincidence of the pulsar spin down luminocity and gamma-ray luminocity

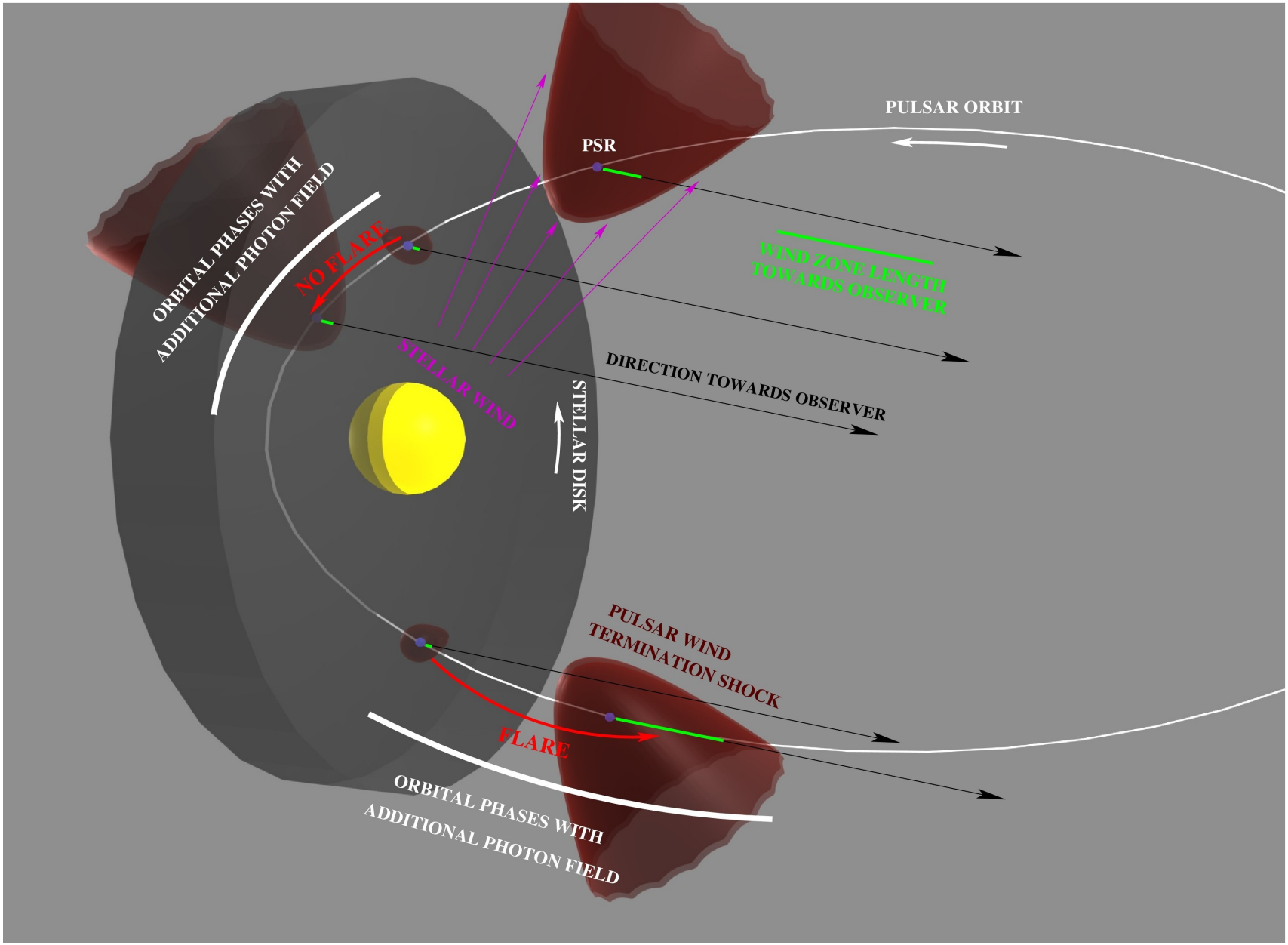
2. No counterpart at other wavelength.

The properties of the plasma flows should be taken into account to interpret so exotic flares.

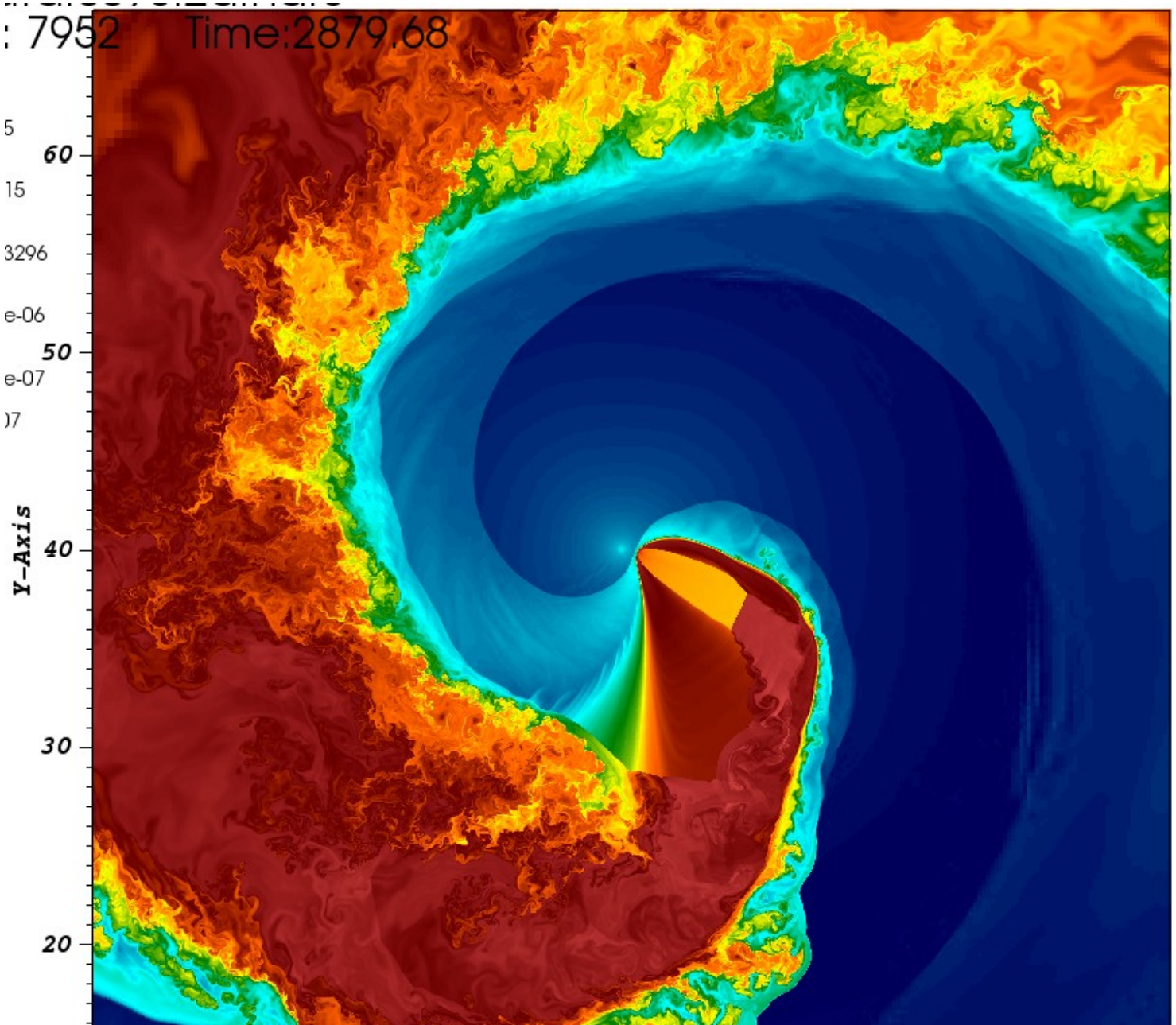
The structure of the flow at the interaction of the wind from pulsar and O star



Schematic view on the interaction of the winds



The structure of the wind in large scale(Bosch-Ramon, Barkov, Khangulyan, Perucho, 2012)



Parameterization for spherically symmetric winds.

At Lorentz factor γ >> 1

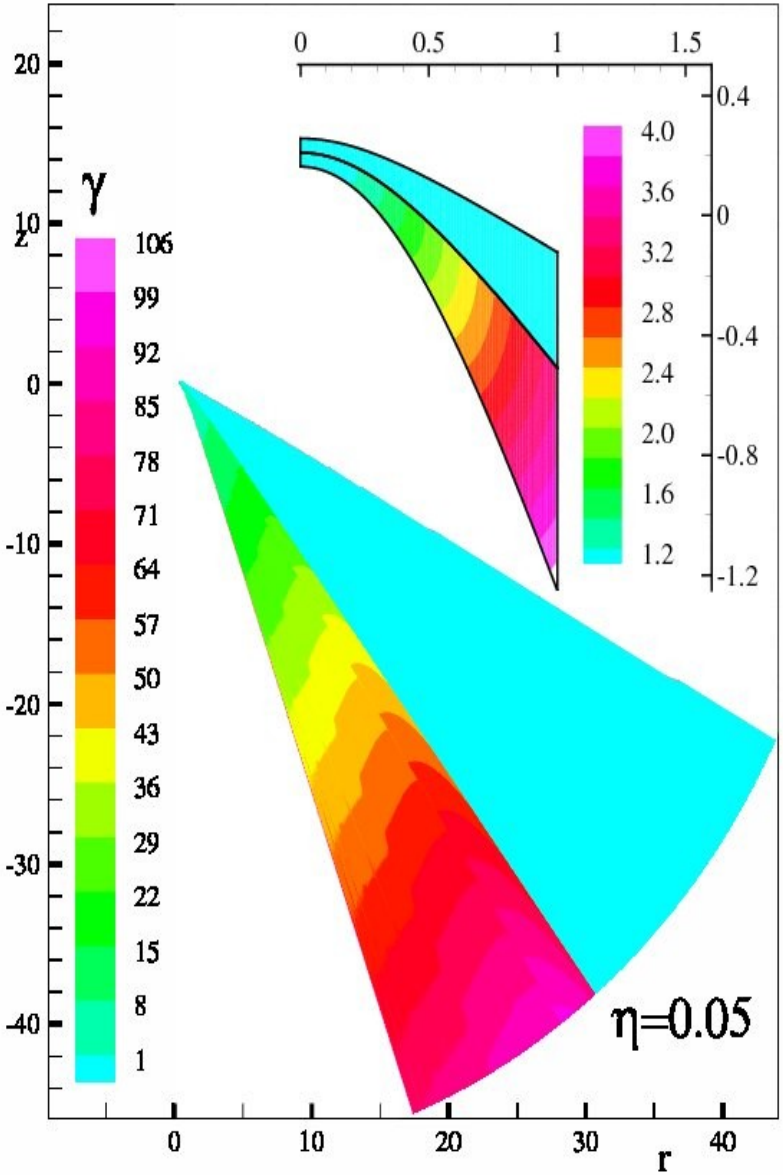
All the flow depends on the only parameter

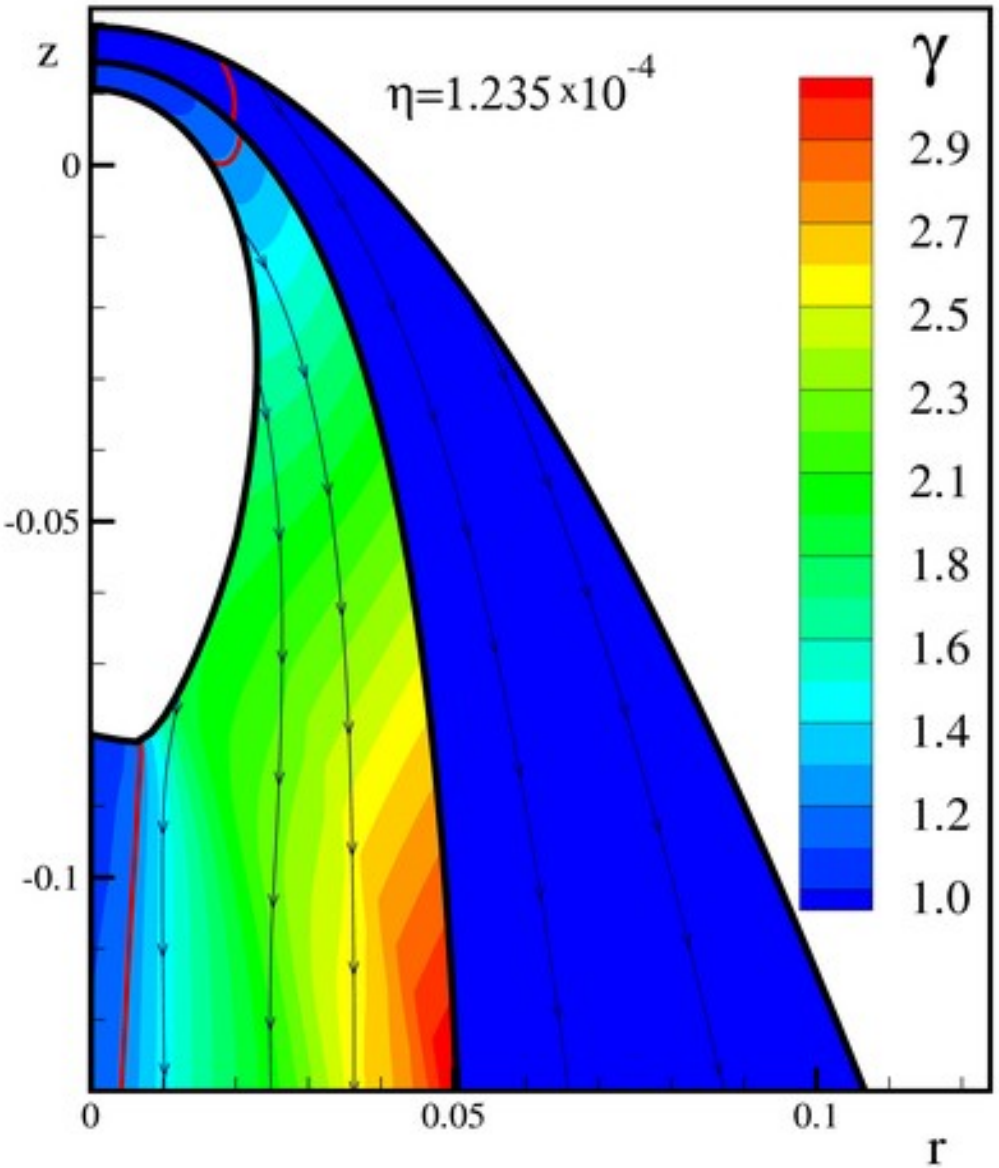
$$\eta = \frac{\dot{E}_{rot}}{c\,\dot{M}\,v_0}$$

For PSR 1259-63 10-2 <η<1

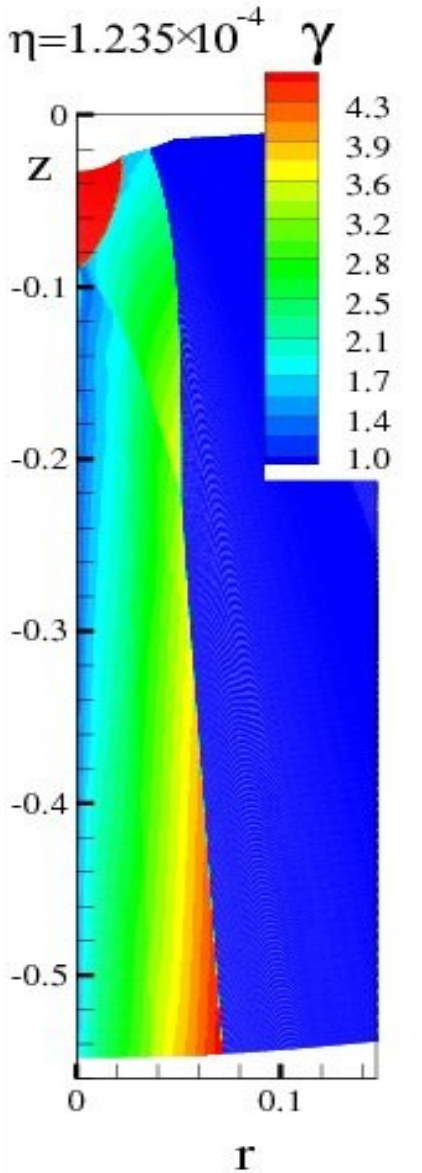
Dependence of the shock front on η

(η > 1.25 10^{-2} the shock front is opened)



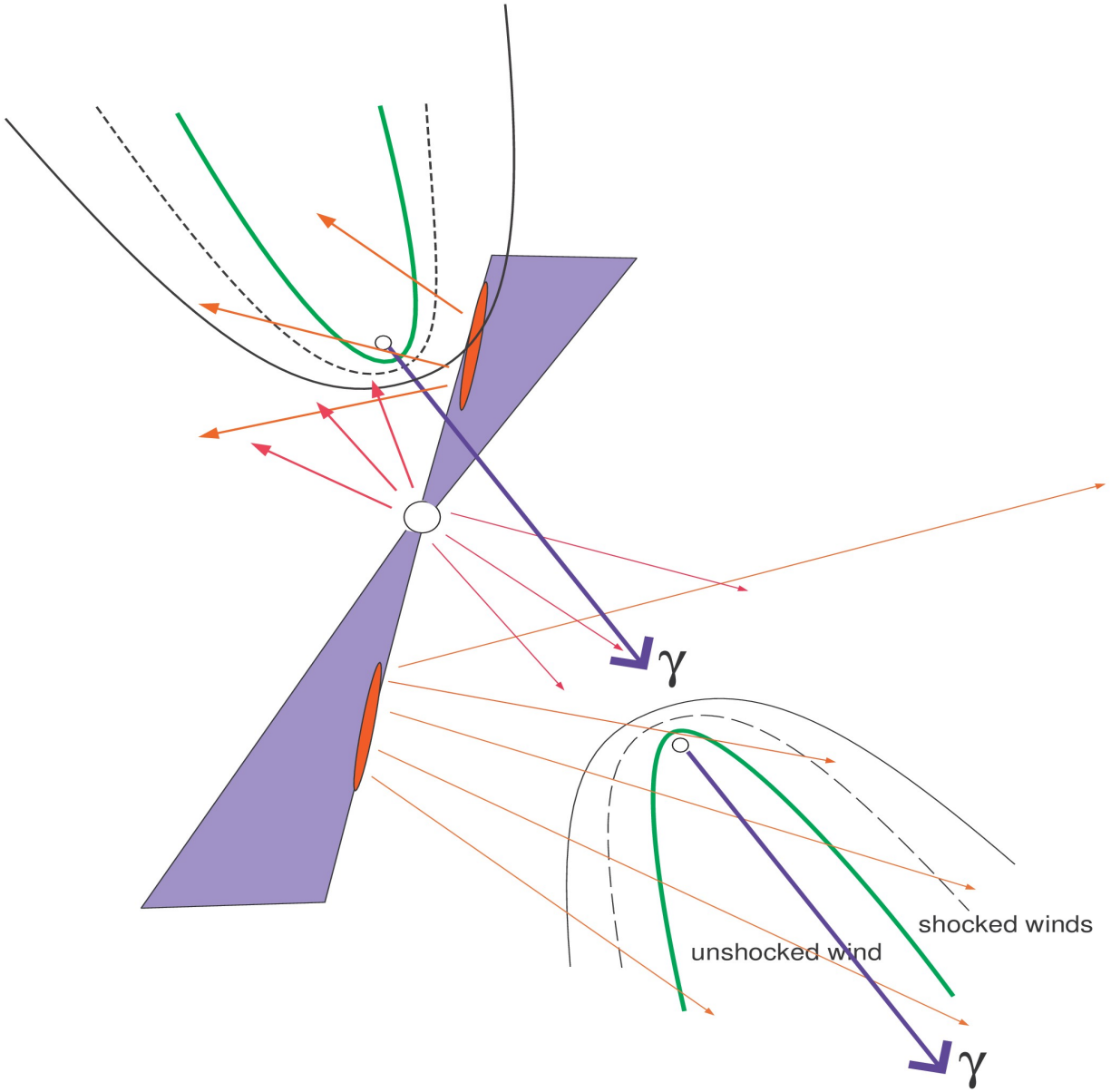


Adiabatic cooling and acceleration of the post shock wind with formation of the jet-like flow

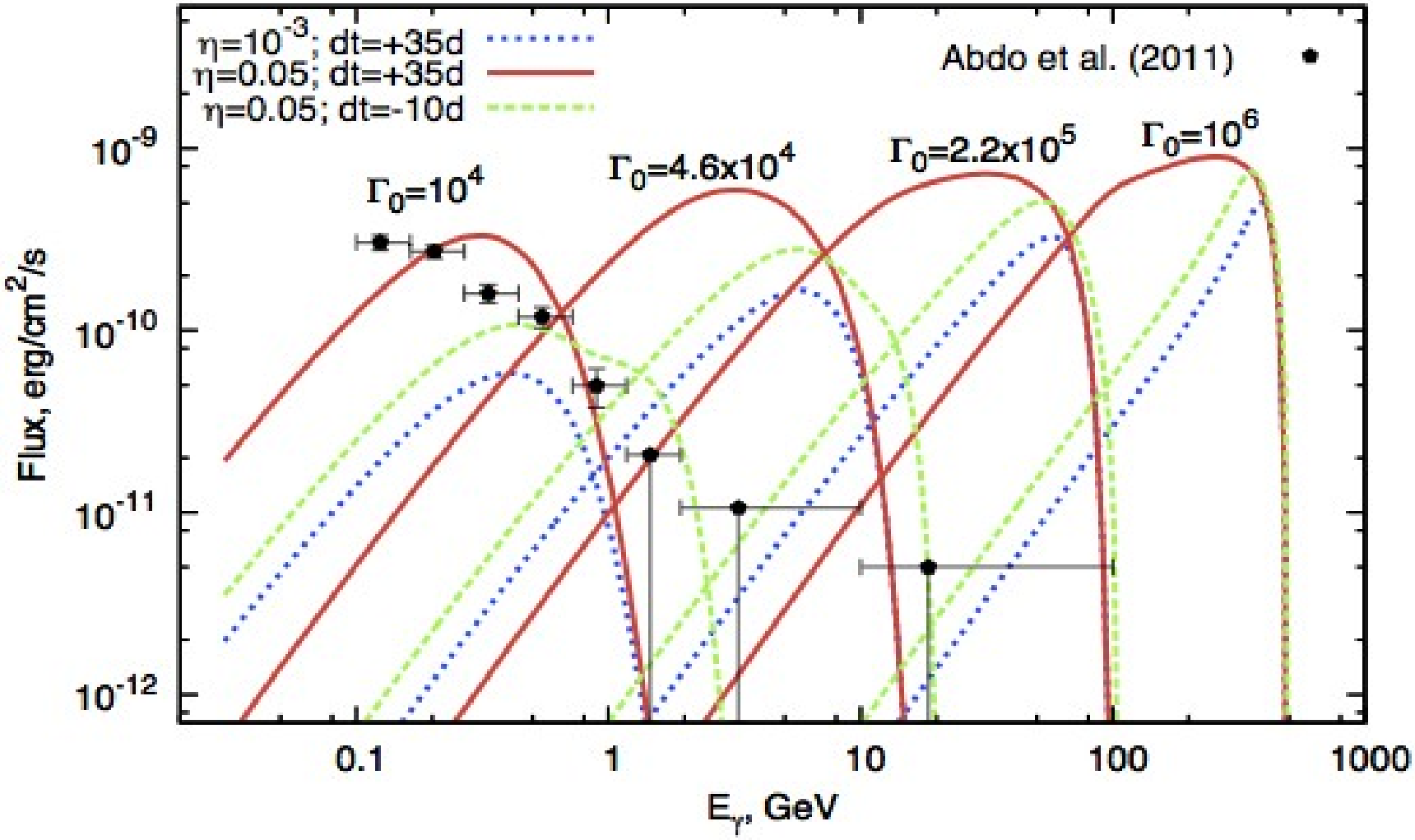


Magnetic field and anisotropy of the pulsar wind does not strongly change the results (Bogovalov et al., 2012)

Generation of gamma-rays by unshocked wind



Spectra at the peak of the emission



Conclusions

1. Lorenz factor of the wind is close to 10^4

This is the second case of observational estimate of the Lorenz factor of the wind

(The wind from Crab pulsar gives ~ 10^6, Aharonian et al.2012)

2. The disk should be the source of an additional IR photons