Very high energy neutrinos from Gamma Ray Bursts in dense clusters

Włodzimierz Bednarek & Andrzej Śmiałkowski

Department of Astrophysics, University of Lodz, Poland

UNIVERSITY OF LODZ

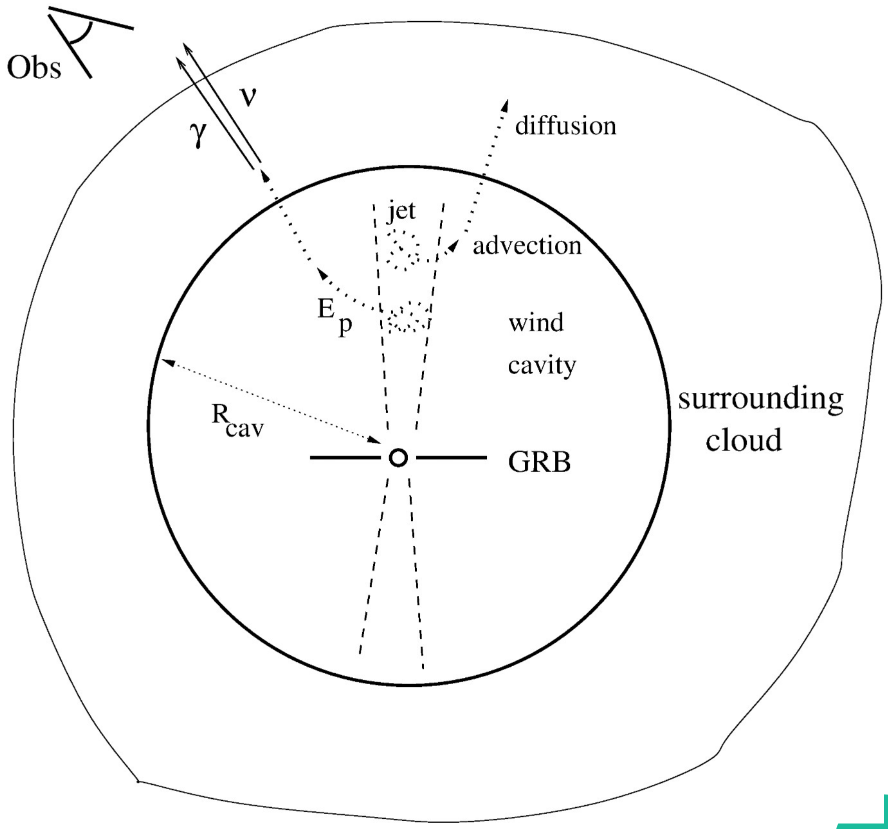
FACULTY OF PHYSICS AND APPLIED INFORMATICS University of Lodz

Long GRB which is produced in explosion of a massive WR type star within huge and dense cloud.

The progenitor star produce stellar wind cavity with the radius, R_{cav}, within which the relativistic jet propagates.

Protons, accelerated in the outer parts of the jet, escape from it into the stellar wind region and then are injected into the dense giant cloud.

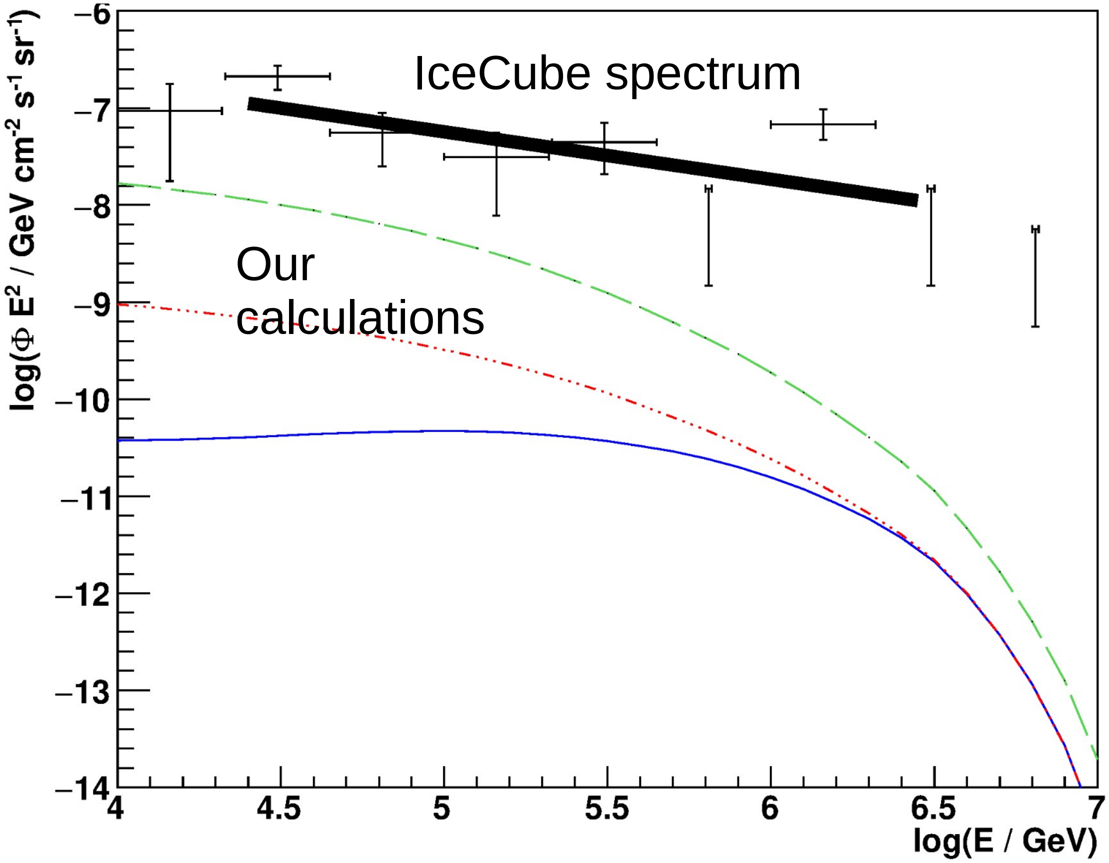
During diffusion process in the cloud, relativistic protons collide with the matter producing high energy neutrinos.



Very high energy neutrinos from Gamma Ray Bursts in dense clusters

Włodzimierz Bednarek & Andrzej Śmiałkowski
Department of Astrophysics, University of Lodz, Poland

Extragalactic diffuse neutrino background (ENB) calculated for the three models with different assumptions on the importance of adiabatic energy losses of hadrons.



Włodzimierz Bednarek & Andrzej Śmiałkowski
Department of Astrophysics, University of Lodz, Poland

Conclusions

- Neutrino emission, produced in terms of this scenario, is expected to last for thousands of years after the initial GRB. Therefore the observed extragalactic neutrino background can originate in GRBs which exploded long time ago.

- Our model in the case of negligible adiabatic energy losses of relativistic hadrons is able to contribute significantly to the ENB at energies below ~100 TeV. The higher energy ENB should be produced in another process, e.g. in the inner parts of the relativistic jets of GRBs.