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Gamma Ray Burst Neutrino Telescope

GRBNeT:

an underwater telescope to detect high energy neutrinos for the observation of Gamma-ray bursts

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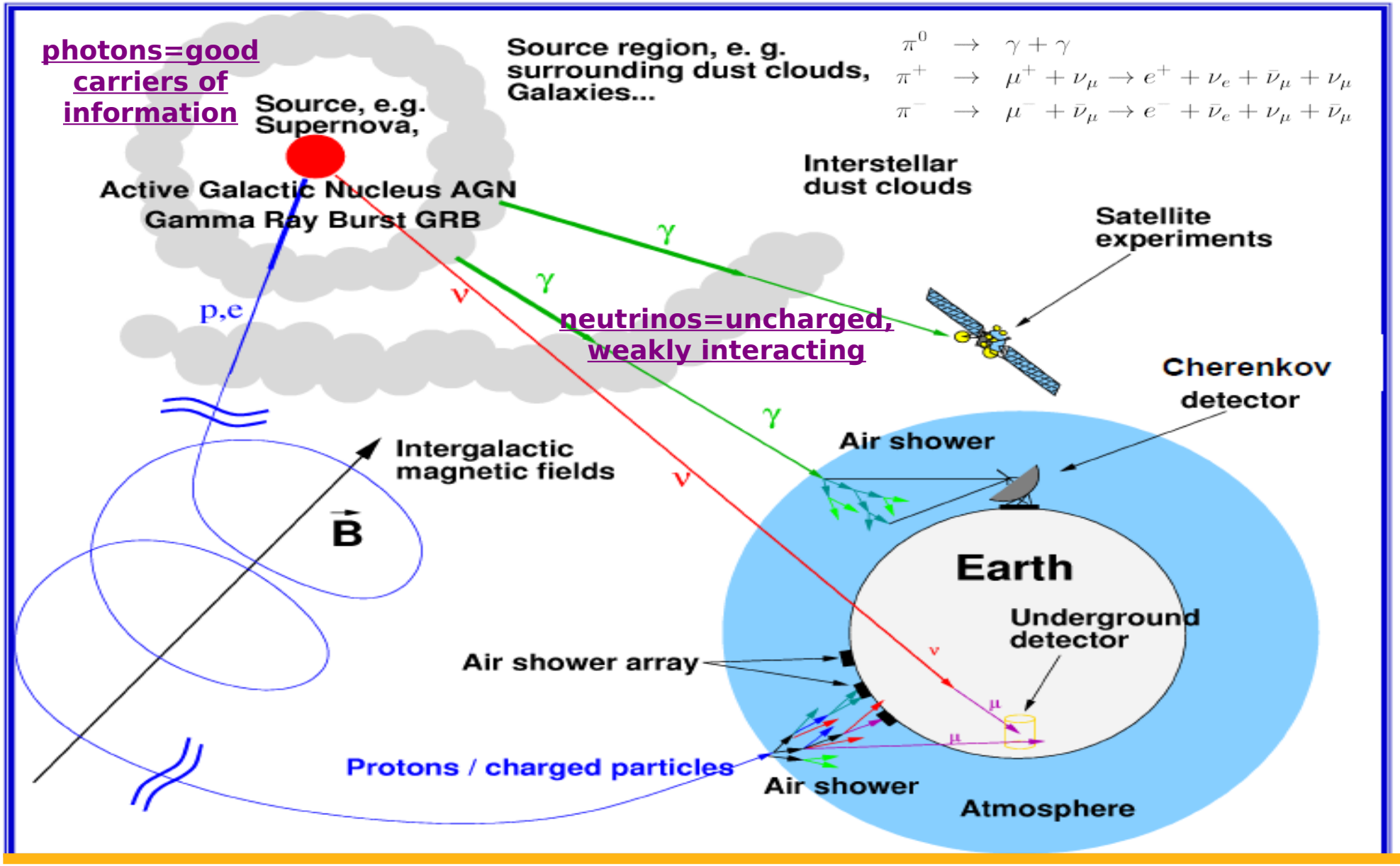
Outline

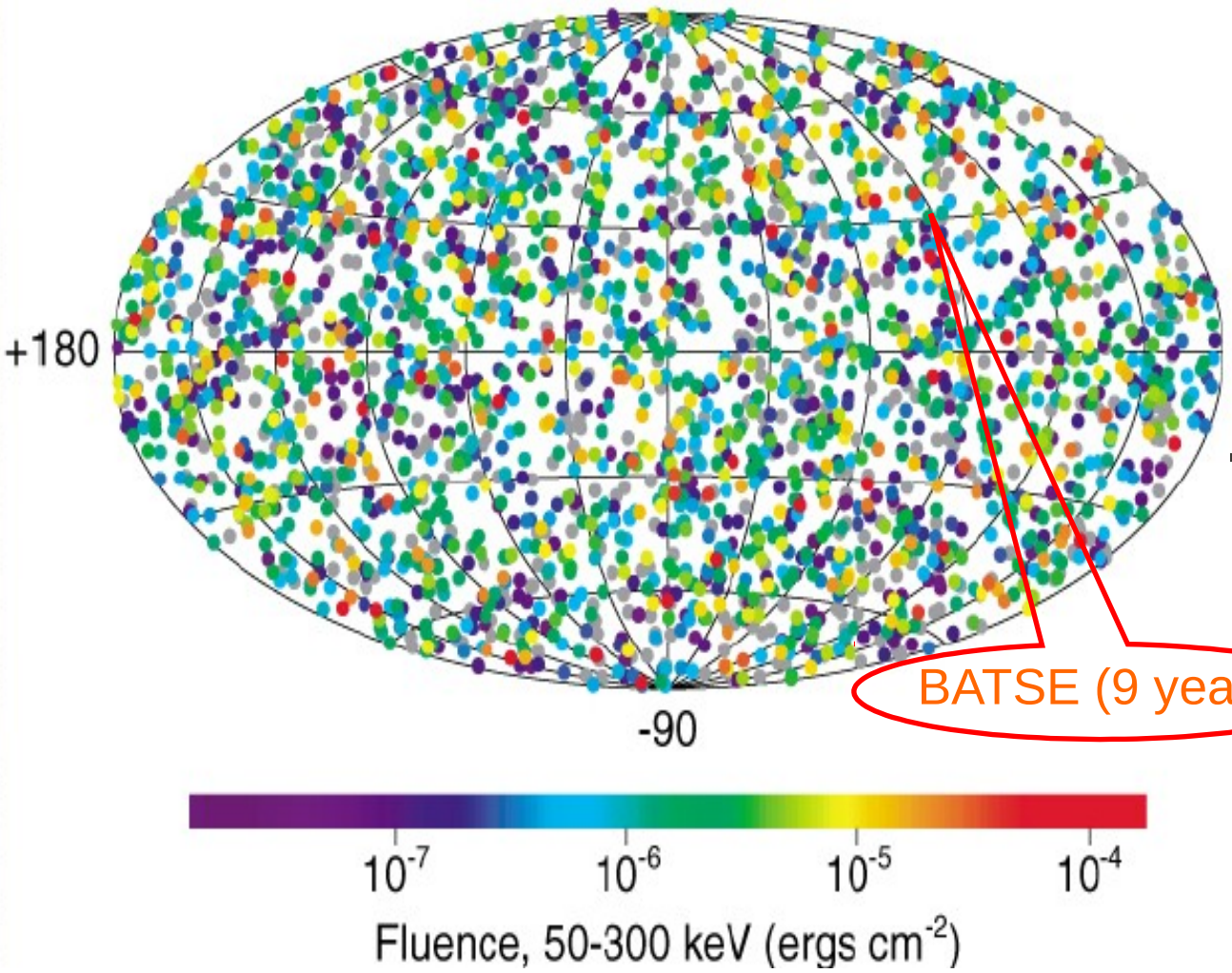
- **Introduction**
  - i) Motivation for neutrino astrophysics
  - ii) Gamma Ray Bursts
- **Gamma Ray Burst Neutrino Telescope - GRBNeT**
  - i) Site
  - ii) Detector layout
- **Results**
  - simulations for background rejection
- **Summary-Conclusions-Outlook**

Motivation for neutrino astrophysics

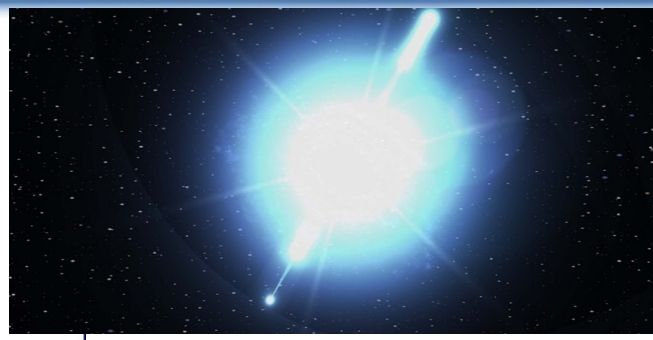


Gamma Ray Bursts

Distribution of GRBs in the sky



BATSE (9 years)



14 December, 1997. (Photo: Reuters)

GRB duration:

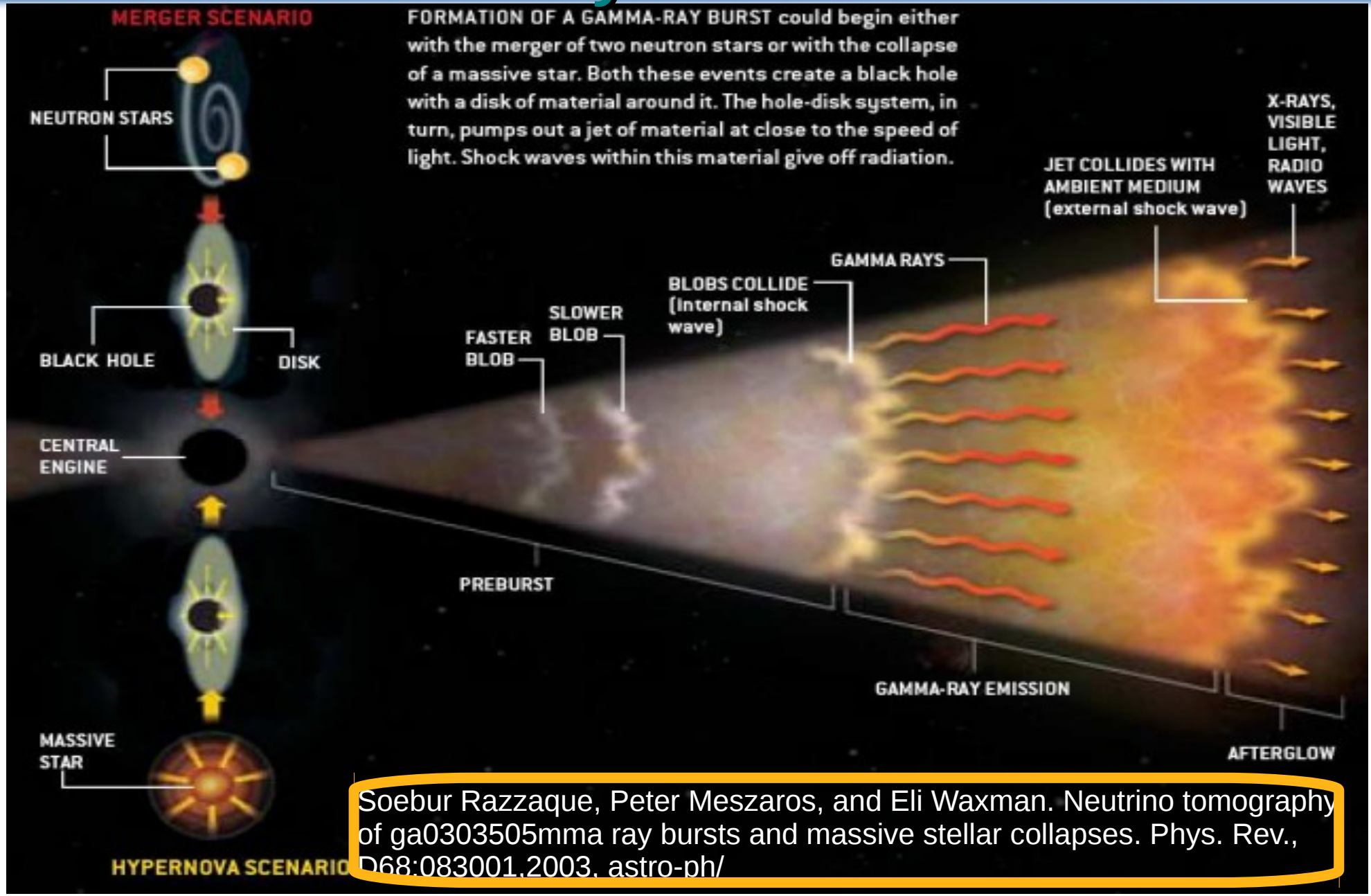
-short duration ~ 0.3 s

-long duration ~ 30 s

Kouveliotou et. al. (93)

Briggs et. Al. (2002)

Gamma Ray Bursts Sources



Soebur Razzaque, Peter Meszaros, and Eli Waxman. Neutrino tomography of ga0303505mma ray bursts and massive stellar collapses. Phys. Rev., D68:083001,2003. astro-ph/

Gamma Ray Burst Neutrino Telescope
GRBNeT

main characteristics

- **Autonomy** in terms of power supply requirements and ability to collect and store locally data for a year at a water depth of about 3500 m
- **Cost minimization** (geometry, mechanical structure, energy requirements, choice of batteries, process of sea deployment)
- **Realistic & feasible operational requirements** for field tests in the sea (existing boats, surface deployment platforms)

Site Selection

---Close to the coast

--- depth of 3500 m

---Good optical properties in water

---Low level of bioluminescence

---Low rate of sedimentation

---Low velocity bottom current

Detector layout

1 floor

30 m

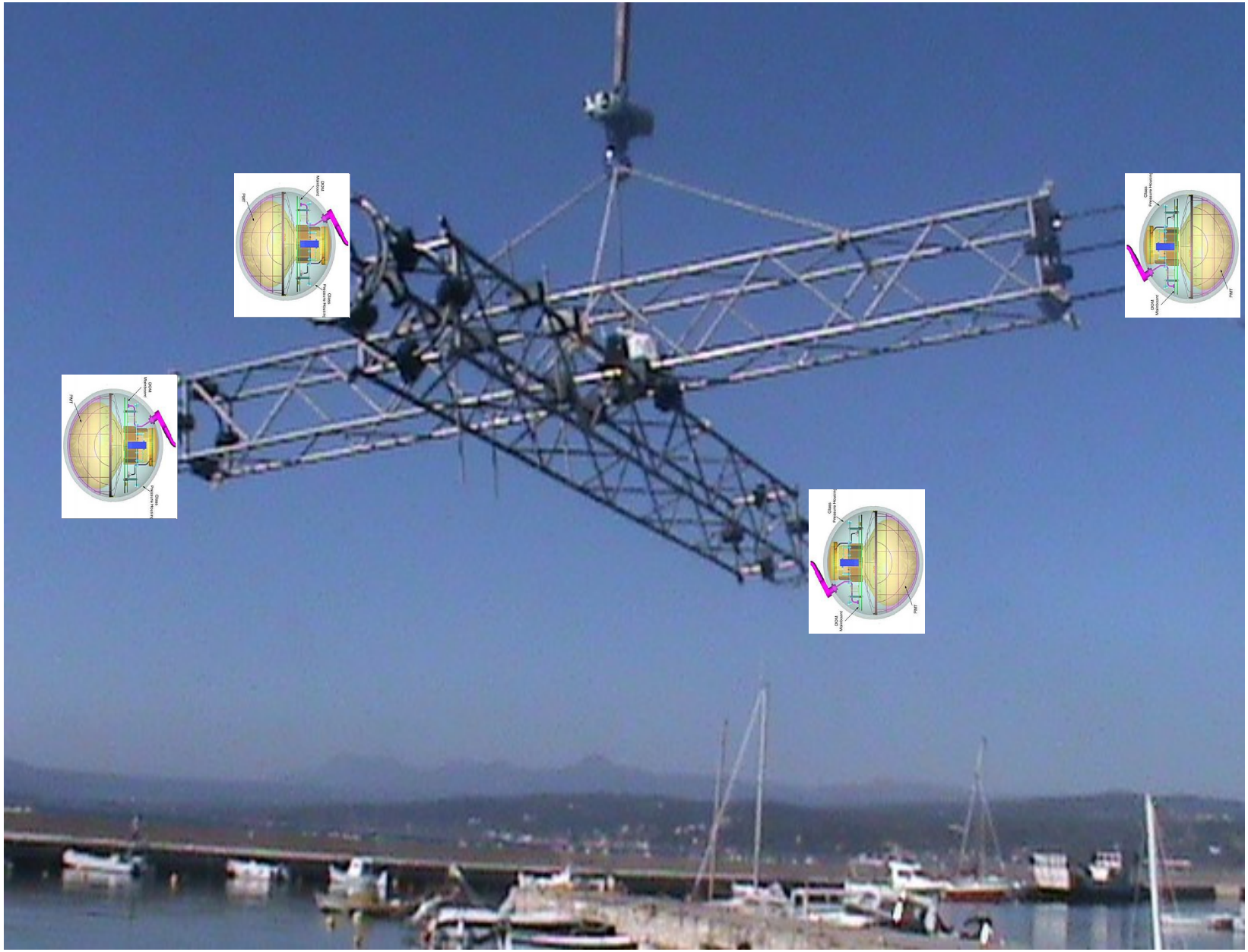
2 floor

300 m

3 floor

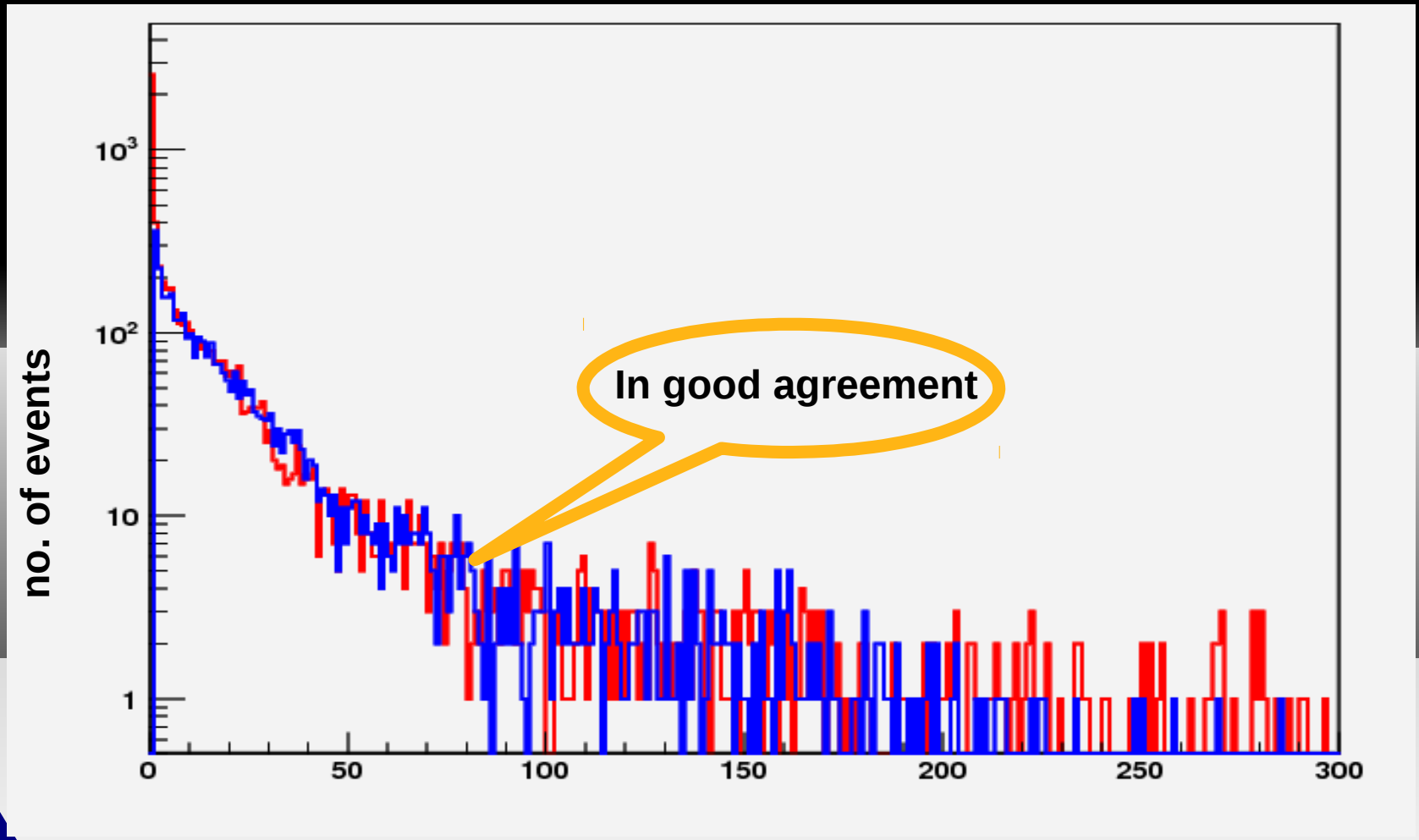
30 m

4 floor

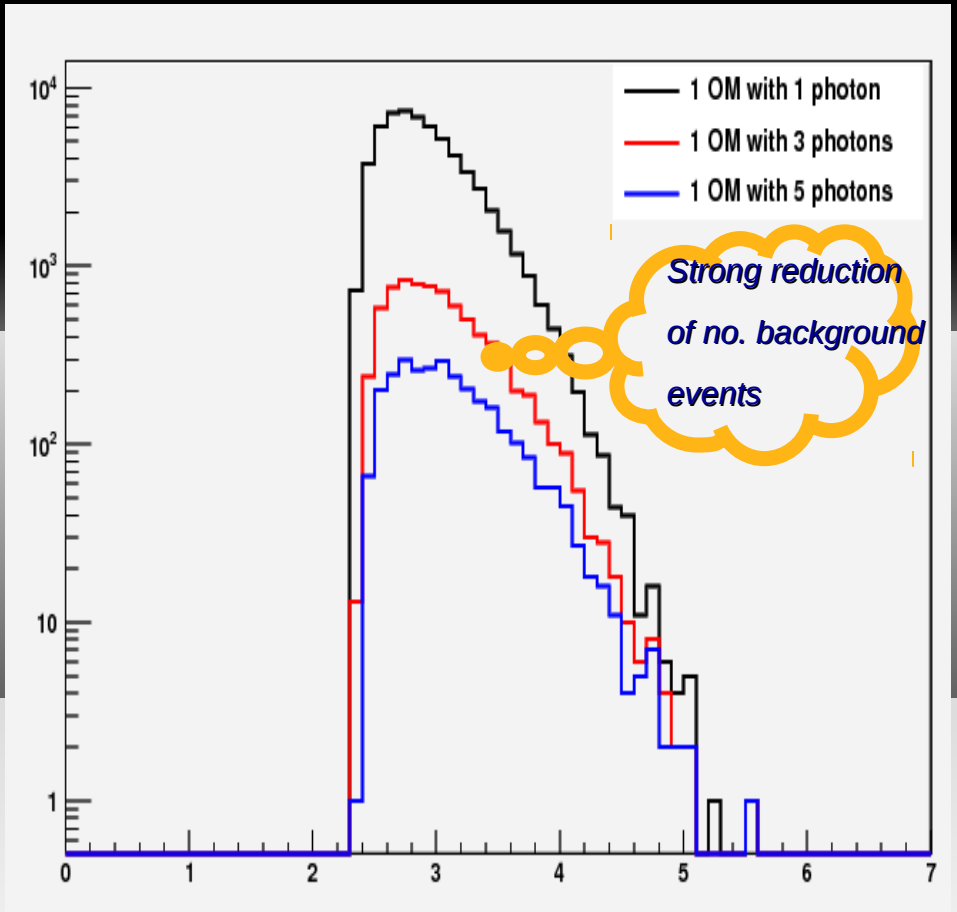


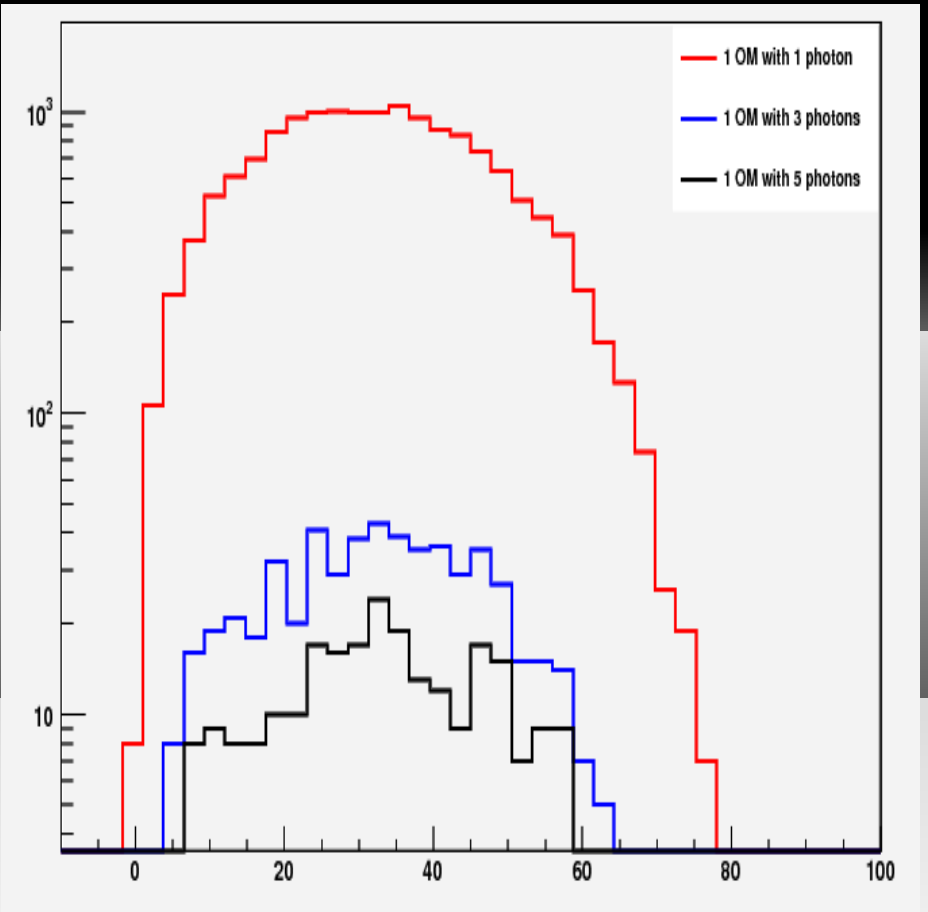
Simulation efforts focusing on high background rejection

-- Fast simulation package



Contribution of atmospheric muon background for all events with at least 1 OM





no. of background events expected during 24 hrs of operation for OMs on the **same floor**

Threshold acceptance 3 p.e.

condition	muons/day
1 OM	2816
2 OMs	579
3OMs	200

Threshold acceptance 5 p.e.

condition	muons/day
1 OM	1239
2 OMs	271
3 OMs	97

no. of background events expected during 24 hrs of operation for OMs on two floors

condition	muons/day
4 OM's charge 3 p.e.:	113
4 OM's charge 5 p.e.:	61
5 OM's charge 3 p.e.:	26
5 OM's charge 5 p.e.:	10

CONCLUSION

- We have proposed an **autonomous** underwater string at a low cost for detecting high E neutrinos from GRBs
- We have performed simulations in order to optimize our detector
- Aim to provide valuable information, insights and answers to the question of GRB origin mechanisms
- Well under way both in mechanical structure, electronics and testing
- Planning to deploy next year

Thank you for your attention

KONSTANTIA BALASI

GRBNeT project