

*I am very happy to enclose the press release of our recent great discovery of ICRA/ICRANet which we were looking for since various decades. I have decided to make the first presentation in one of the territory most tortured by war events in Bosnia and Herzegovina, on occasion of the signing ceremony of the collaboration agreement between ICRANet and the University of Tuzla. These results will soon be presented in Rome and in Washington DC.*

### **A fundamental discovery by the ICRA/ICRANet group**

The milestone of understanding the nature of Gamma Ray Bursts (GRBs), presented today in the most prestigious Astrophysical Journal by scientists of ICRA/ICRANet at the University “Sapienza” (see: <https://arxiv.org/pdf/1704.03821.pdf>) show how GRBs originates in the most complex system ever studied in physics and astrophysics and energetically the most powerful in the Universe. “In only 100s a supernova (SN) is observed to explode and hypercritically accrete at a rate  $\sim 1$  Msun/s on a tightly bound binary neutron star (NS) companion. In sequence, the NS, after reaching its critical mass, gravitationally collapse to a Black Hole (BH) emitting a GRB. The GRB impacts on the SN ejecta, it originates an X-ray and gamma Flare and transforms the SN in a hypernova. This “cosmic matrix”, named Binary-driven-hypernova (BdHN), is the most energetic of seven GRB subclasses”. GRBs are the most luminous objects in the Universe and can consequently be observed at 10 billions light year of distance in our past light cone: their luminosities equal the summed luminosities of all the stars of our Universe, the luminosity of 100 billions of billions of Suns! A GRB occurs every 100 million years in a galaxy and is visible in all the billions of

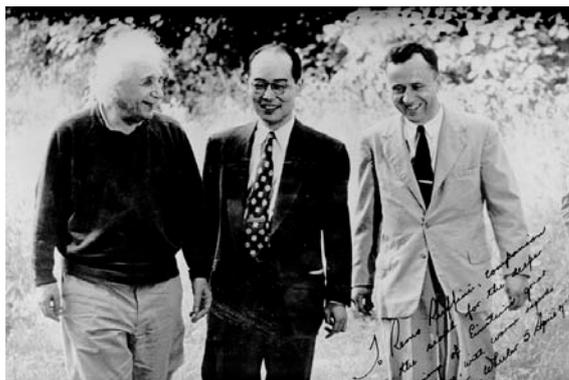


Figure 1: Left to right A. Einstein, H. Yukawa, J.A. Wheeler

galaxies of our Universe: the product gives a GRB rate of circa “one a day”, an ideal rate for unveiling their nature on the ground of Einstein theory see Fig. 1. Essential has been the observational effort in the X and gamma rays, with space missions (e.g. BeppoSAX, SWIFT, FERMI) with vigorous European presence and with the European ESO VLT and the US KECK optical observatories. Crucial has been the ICRANet theoretical effort in attributing the astrophysical meaning to the observed photons received by these observatories from systems which preceded by 8 billion years the birth of our planetary system! This effort is well summarized in 25 additional papers by the same authors, quoted in the above article. Professor Ruffini has been for many years on the forefront of this



Figure 2: R. Ruffini discussing with J.A. Wheeler in Princeton (1971)

research: from “introducing the Black hole” with J. A. Wheeler (see Fig. 2) to the discovery of the first BH with R. Giacconi (see Fig. 3), to the first announcement of the GRB discovery with H. Gursky, to the developments in the recent years of the BdHNe with Profs. C.L. Bianco, J. Rueda and C. Fryer and the many students of the joint European Ph.D. Program, the IRAP PhD, at the University of Rome (see Fig. 4)



Figure 3: From left to right H. Gursky, R. Giacconi, R. Ruffini. Naval Research Laboratory, Washington D.C., 1984.



Figure 4: Picture of Prof. Ruffini with young researchers who participated in this discovery.

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## Photos



Mediji o PMF-u i ICRANet-u



Public lecture by the Director of ICRANet and official signing of Agreement of Collaboration at the University of Tuzla



Javno predavanje Direktora ICRANET-a i potpisivanje Sporazuma o suradnji na Univerzitetu u Tuzli

## Videos

