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Scientific Work

Follow-up of Supernovae:, Photometric and Spectroscopic Evolution, Rates

Supernova and Gamma-ray Burst connection

Galactic and extragalactic Novae

Supernovae-Ia and Gamma-ray Bursts as rulers for cosmological parameters

Kilonovae and short Gamma-ray Bursts

Brief description

My ongoing research concern the study of several classes of transient phenomena such as: Supernovae, Gamma-ray Bursts, Kilonovae and Novae.

Gamma-ray bursts and their Afterglows. My interest in this area started in 2000 when I became member of the SWIFT follow-up team. Most efforts are devoted to the study of the connection between Supernovae and GRBs [1][3]. Their high energy follow-up has been studied in [4].

Supernovae. Photometric and the spectroscopic study of all types of SNe (Ia, Ib/c, II-linear, II-plateau) near maximum light and at late stages and their theoretical modeling. The observations at maximum provide us with the necessary data for using SNe (Ia and II) as standard candles. The observations at later stages allow one to discriminate among different energy sources (i.e. radioactive decay, pulsar, light-echo), to model the mechanisms of the explosion, and to shed light on the nature of the progenitor [5, 11]. The possibility to detect neutrinos and GWs from nearby events has been studied in [8] and [9].

Kilonovae. The study of kilonova rate associated with short GRBs (e.g. 179817A) has been carried out on theoretical and statistical grounds [13].

Novae. Classical and Recurrent Novae are objects of great interest because they are considered potential progenitors of SNe-Ia and important contributors to the Galactic nucleosynthesis [2, 6].

SN and GRB Cosmology.

Two important topics have been faced off:

i) we have obtained a new calibration of the magnitude at maximum of SNe-Ia obtained via Surface Brightness distance indicator method [10]. We confirm the existence of a ~3σ tension between PLANK and local distance indicators on the H_o measurements.

ii) we show on the basis of a new sample of GRBs that at $z \leq 1.2$ w(z) agrees within 1σ with the standard value w = -1 (cosmological constant). The situation is different at larger z, where gamma-ray bursts suggest that w(z) seems to deviate from w = -1 at 2σ and 4σ level, depending on the redshift bins [12] (admittedly this result is based on rather poor statistic).

2021 List of Publication

1.
The supernova of the MAGIC GRB190114C
Melandri, A.; Izzo, L.; Pian, E. and 42 more
2021arXiv211204759M

2.
Detection of 7Be II in the Small Magellanic Cloud
Izzo, Luca; Molaro, Paolo; Cescutti, Gabriele and 8 more
2021 MNRAS.tmp.3442I

3.
Outflows from GRB hosts are ubiquitous: Kinematics of z < 0.3 GRB-SN hosts resolved with FLAMES

Thöne, C. C.; Izzo, L.; Flores, H. and 12 more
2021A&A...656A.136T

4.
Time domain astronomy with the THESEUS satellite
Mereghetti, S.; Balman, S.; Caballero-Garcia, M. and 74 more

2021ExA...tmp..143M

5.
Less than 1% of Core-Collapse Supernovae in the local universe occur in elliptical galaxies
Irani, I.; Prentice, S. J.; Schulze, S. and 40 more
2021arXiv211002252I

6.
Classical Novae: Galactic lithium factories?
Izzo, Luca; Aydi, Elias; Della Valle, Massimo and 6 more
2021hst..prop16745I

7.
Separating 39Ar from 40Ar by cryogenic distillation with Aria for dark-matter searches
Agnes, P.; Albergo, S.; Albuquerque, I. F. M. and 307 more

2021EPJC...81..359A

8.
Sensitivity of future liquid argon dark matter search experiments to core-collapse supernova neutrinos
DarkSide-20k Collaboration; Agnes, P.; Albergo, S. and 274 more

2021JCAP...03..043D

9.
Lunar Gravitational-wave Antenna

Harms, Jan; Ambrosino, Filippo; Angelini, Lorella and 55 more
2021ApJ...910....1H

10.
A new measurement of the Hubble constant using Type Ia supernovae calibrated with surface brightness fluctuations
Khetan, Nandita; Izzo, Luca; Branchesi, Marica and 15 more

2021A&A...647A..72K

11.
SN 2019muj - a well-observed Type Iax supernova that bridges the luminosity gap of the class
Barna, Barnabás; Szalai, Tamás; Jha, Saurabh W. and 38 more

2021MNRAS.501.1078B

12.
Tracing Dark Energy History with Gamma-Ray Bursts
Muccino, M.; Izzo, L.; Luongo, O. and 5 more

2021ApJ...908..181M

13.
Predicted rates of merging neutron stars in galaxies
Molero, Marta; Simonetti, Paolo; Matteucci, Francesca and 1 more

2021MNRAS.500.1071M