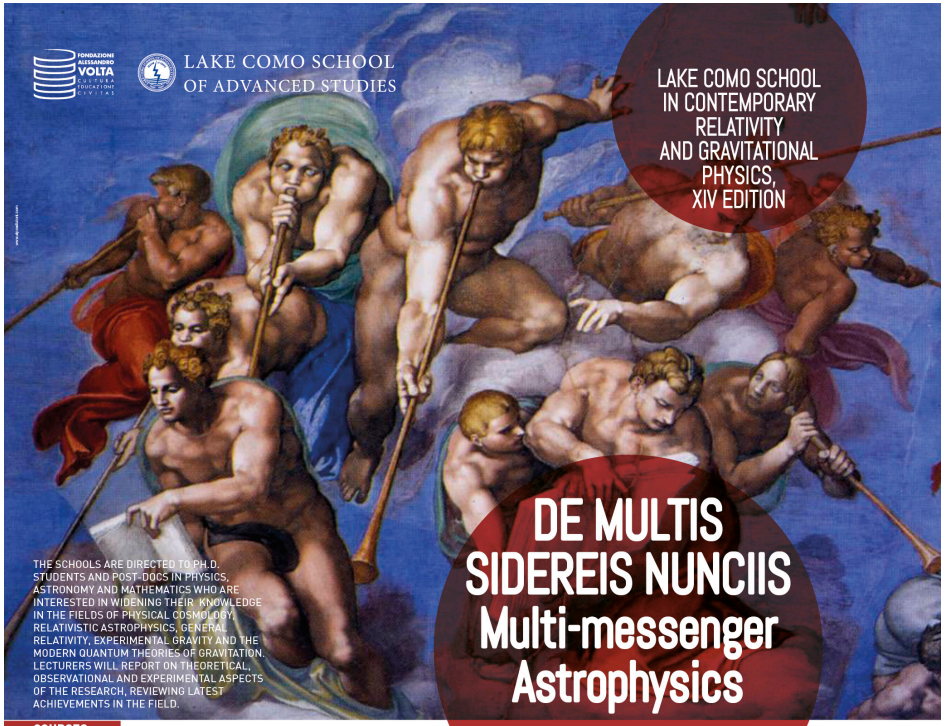
FLAG

FieLds And Gravity

Ugo **Moschella**	PO (Insubria)	Fis02 FISICA TEORICA, MODELLI E METODI MAT.
Francesco **Belgiorno**	PA (Polimi)	MAT/07 FISICA MATEMATICA
Sergio **Cacciatori**	PA (Insubria)	Fis02 FISICA TEORICA, MODELLI E METODI MAT.
Remo **Garattini**	PA (Unibg)	Fis02 FISICA TEORICA, MODELLI E METODI MAT.
Oliver **Piattella**	RUTB (Insubria)	Fis02 FISICA TEORICA, MODELLI E METODI MAT.
Yan **Sheng Feng**	Postdoc (INFN)	Cosmological perturbations. Nongaussianities
Roberta **Angius**	Dottoranda	Intersection theory methods in string theory
Davide **Astesiano**	Dottorando	Exact solutions in gauged supergravity in four dimensions
Maria **Conti**	Dottoranda	Intersection theory methods for Feynman integrals in QFT
Angelo **Da Silva Hartmann**	Dottorando	Gravitational waves in different theories of gravity
Mattia **Lacchini**	Dottorando	Langlands methods in Yang-Mills theory
Elias Arawi Sol **Megier**	Dottorando	Alternative theories of gravity
Federica **Muscolino**	Dottoranda	Phenomenology of nuclear physics from the Skyrme equation
Simone **Trevisan**	Dottorando	Analogue gravity in dielectric media



LAKE COMO SCHOOL OF ADVANCED STUDIES

LAKE COMO SCHOOL IN CONTEMPORARY RELATIVITY AND GRAVITATIONAL PHYSICS, XIV EDITION

DE MULTIS SIDEREIS NUNCIIS Multi-messenger Astrophysics

VILLA DEL GRUMELLO, COMO, ITALY

28 JUNE - 2 JULY 2021

THE SCHOOLS ARE DIRECTED TO PH.D. STUDENTS AND POST-DOCS IN PHYSICS, ASTRONOMY AND MATHEMATICS WHO ARE INTERESTED IN WIDENING THEIR KNOWLEDGE IN THE FIELDS OF PHYSICAL COSMOLOGY, RELATIVISTIC ASTROPHYSICS, GENERAL RELATIVITY, EXPERIMENTAL GRAVITY AND THE MODERN QUANTUM THEORIES OF GRAVITATION. LECTURERS WILL REPORT ON THEORETICAL, OBSERVATIONAL AND EXPERIMENTAL ASPECTS OF THE RESEARCH, REVIEWING LATEST ACHIEVEMENTS IN THE FIELD.

COURSES

ENRICO BARAUSSE, SISSA TRIESTE
Gravitational waves from compact objects

ANTONIO CAPONE, ROMA LA SAPIENZA
Astrophysical Neutrinos: sources and detections

OM SALAFIA, INAF BRERA, MILANO
Multi-messenger Astrophysics:
multicolored light from LIGO-Virgo sources

GABRIELE GHISELLINI, INAF BRERA, MILANO
Astrophysical processes in exterme gravity

ZOLTAN HAIMAN, COLUMBIA UNIVERSITY, NEW YORK
Multi-messenger Astrophysics at large:
LISA and the electromagnetic sky

ALBINO PEREGO, UNIVERSITÀ DI TRENTO
Binary neutron star mergers as laboratories
for fundamental physics

SPECIALIZED LECTURES

LARISSA CARLOS DE OLIVEIRA SANTOS, YANGZHOU UNIVERSITY, YANGZHOU
Foreground removal in future CMB and 21 cm experiments

MARIAFELICIA DE LAURENTIS, UNIVERSITÀ DI NAPOLI
The black hole shadow of M87

ANTONINO MARCIANO, FUDAN UNIVERSITY, SHANGHAI
Gravitational footprints of massive neutrinos and lepton number breaking

DAVID RADICE, PENNSYLVANIA STATE UNIVERSITY
Numerical relativity simulations of merging neutron stars:
recent results and open problems

MISAO SASAKI, KAVLI INSTITUTE, UNIVERSITY OF TOKYO
Primordial black holes from inflation and gravitational waves

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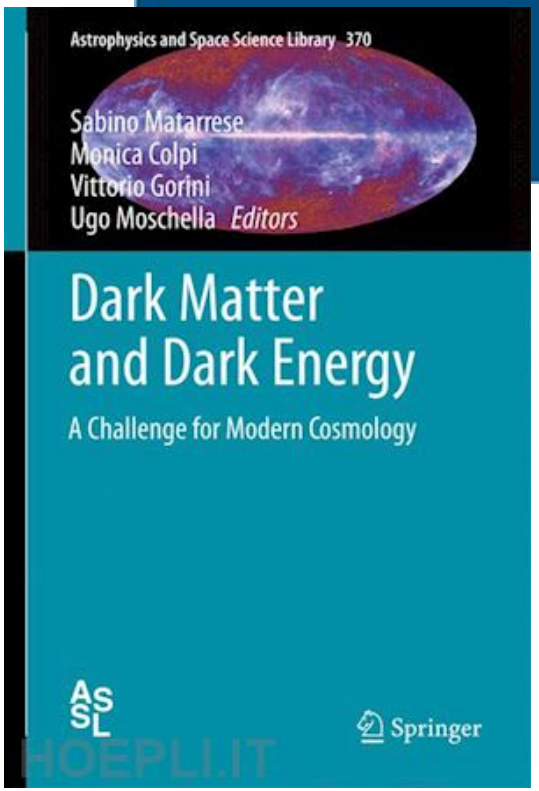
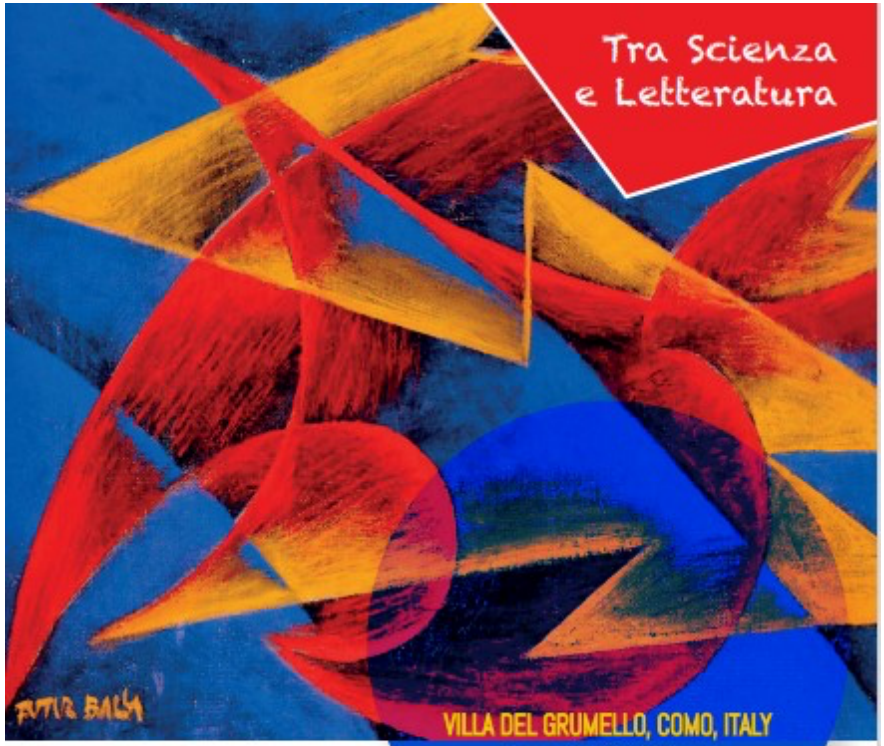
PROGRAM

In 2015 the birth of a new astronomy revealed to us a yet unknown Universe, where pairs of stellar black holes in collision create violent disturbances in the curvature of space-time that reach us as gravitational waves. The detection of the first gravitational wave signal from two colliding neutron stars followed by the emission of multi-color light also heralded the era of Multi-Messenger Astrophysics. Multi-messenger studies aim to find the answer to some of the most important problems in high-energy astrophysics, fundamental physics and cosmology and to discover new phenomena by merging the information from the world's leading observatories sensitive to light, gravitational waves and neutrinos. The School intends to disseminate knowledge on these new themes, exploring how multi-messenger astrophysics informs us about the nature of the most extreme objects in the Universe and about the Universe itself.

Scientific and Organizing Committee: Ugo Moschella (Chair) Sergio Cacciatori, Monica Colpi, Massimo Dotti, Vittorio Gorini, Francesco Haardt, Aldo Treves

Registration forms are available on the web
For information also contact directly the Organizing Secretariat at Fondazione Alessandro Volta: tel. +39 031 579811, fax +39 031 573395
Further information about the School (course abstracts, schedule of lectures, etc.) is also available at the web page https://lakecomoschool.org/MMAP





VILLA DEL GRUMELLO, COMO, ITALY

In memoria di Giulio Giorello

VISIONI DEL MONDO
25-29 OTTOBRE, 2021

Direzione:
Ugo Moschella (direttore)
Nuccio Ordine (condirettore)
Gianmarco Gaspari
Nicoletta Sabadini

Per informazioni e iscrizioni:
Chiara Stefanetti
Fondazione Volta
chiara.stefanetti@fondazionealessandrovolta.it
https://lcl2.lakecomoschool.org/

PROGRAMMA

Remi Brague (Université de Paris Panthéon-Sorbonne, Institut de France)
La sagesse du monde

Alain Connes (College de France, IHES)
Mathématiques, formes et inspiration artistique

Miguel Angel Granada (Università di Barcellona)
Copernico, Bruno, Kepler, Galilei: aspetti della rivoluzione cosmologica e la "libertas philosophandi"

Nuccio Ordine (Università della Calabria)
L'utilità dell'inutile

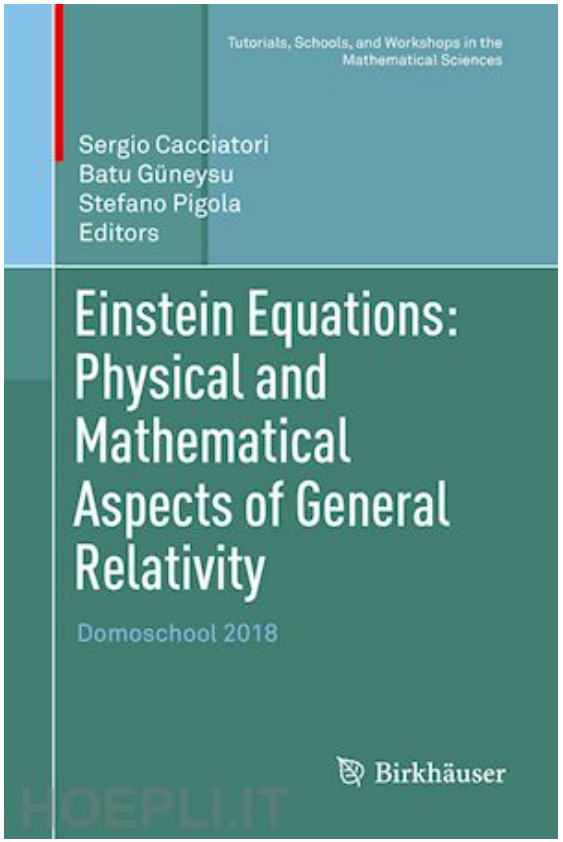
Olivier Rey (Université de Paris Panthéon-Sorbonne)
De la chute de Constantinople à la technologie moderne

Lucio Russo (Università di Roma - Tor Vergata)
Archimede

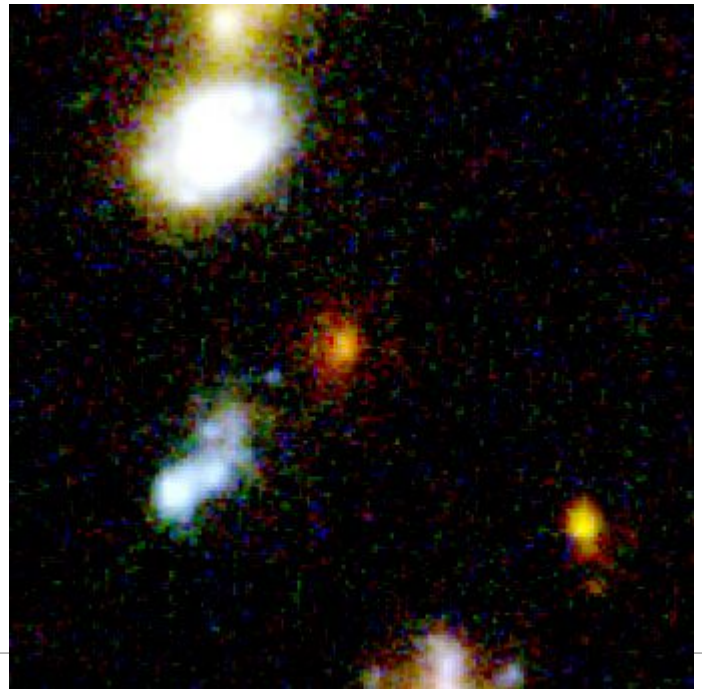
LAKE COMO SCHOOL OF ADVANCED STUDIES

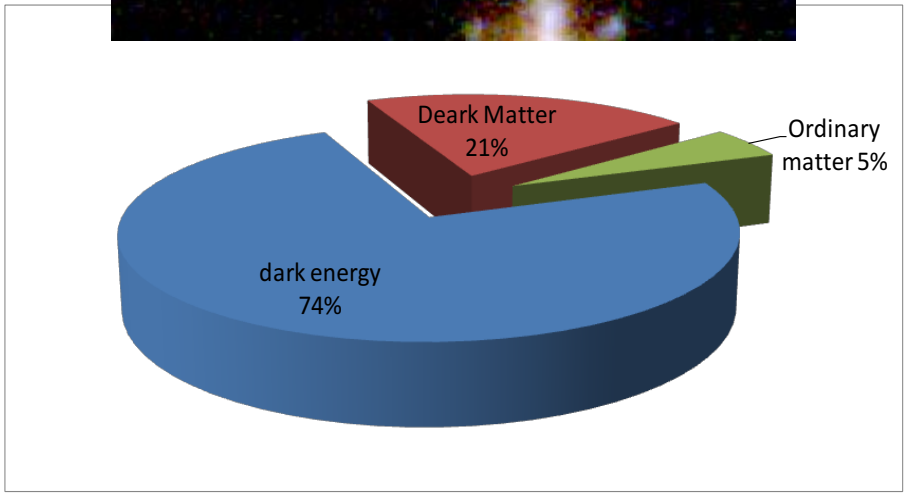
DiSAT


DOMOSCHOOL
International Alpine School of Mathematics and Physics


Tutorials, Schools, and Workshops in the Mathematical Sciences
Sergio Cacciatori
Batu Güneysu
Stefano Pigola
Editors
Einstein Equations: Physical and Mathematical Aspects of General Relativity
Domoschool 2018
Birkhäuser
HOEPLI.IT

1997: la costante cosmologica colpisce ancora



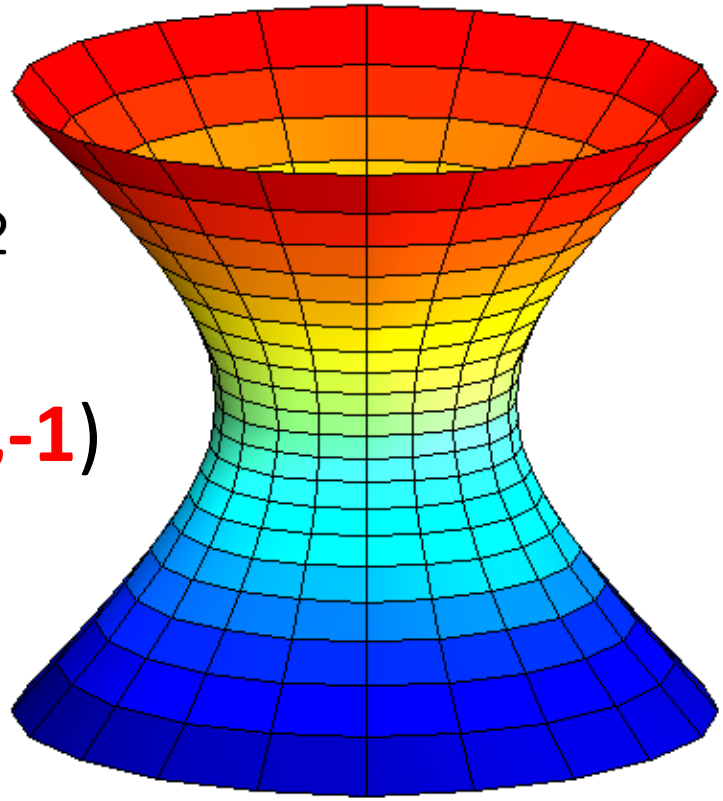


La forma dell'universo

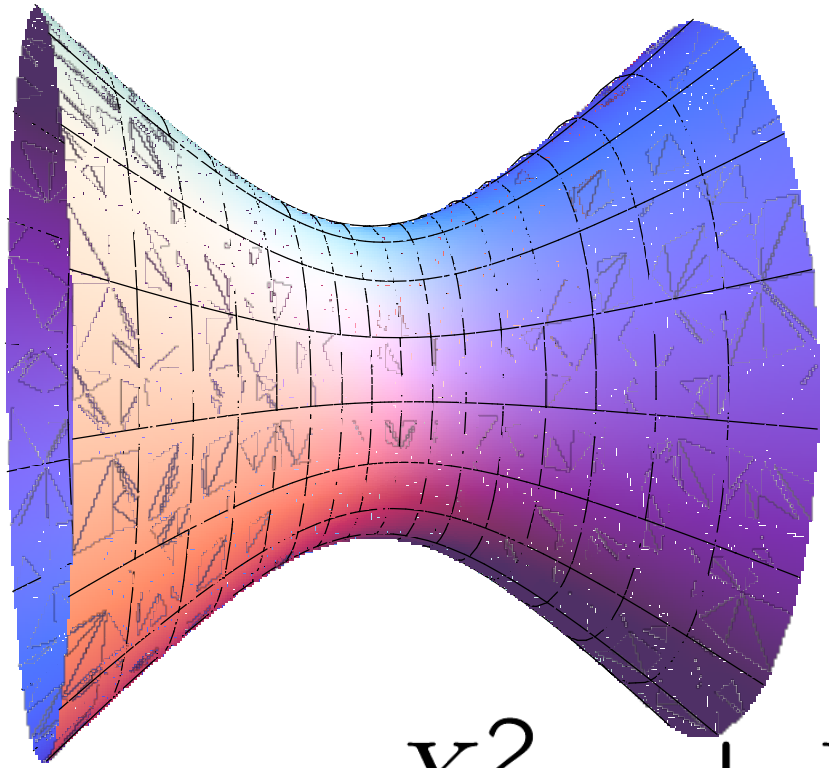
$$X_0^2 - X_1^2 - \ldots X_d^2 = -R^2$$

$M^{(d+1)}$: $\eta_{\mu\nu}$ = diag(**1,-1,……,-1**)

$$G = SO(1,d)$$



AdS/CFT/qualsiasi cosa



$$X_0^2 - X_1^2 - \ldots - X_{d-1}^2 + X_d^2 = R^2$$

$E^{(2,d-1)}$: $\eta_{\mu\nu}$ = diag(**1,-1,……,-1,1**)

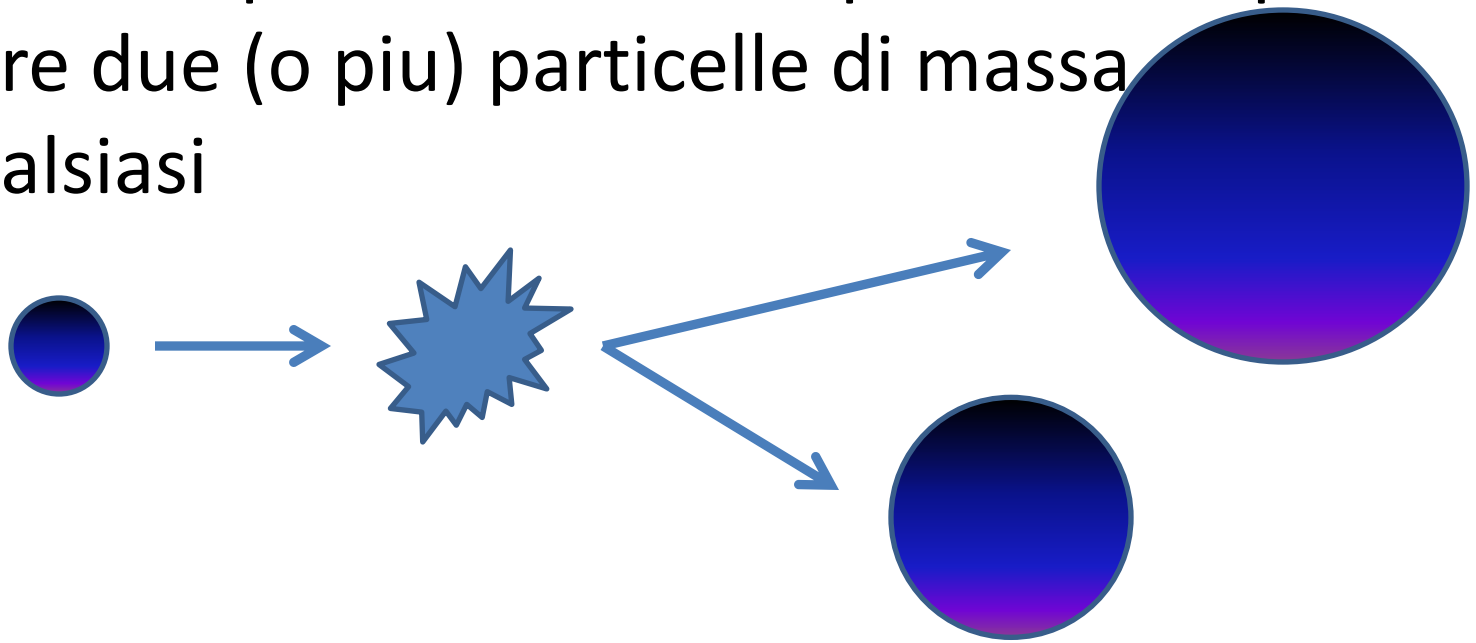
$$SO(2, d-1)$$

Esempio: decadimento di particelle

- Non esistono particelle stabili di massa

$$m^2 \geq \frac{(d-1)^2}{4R^2}$$

- Qualsiasi particella siffatta puo' decomporsi in altre due (o piu) particelle di massa qualsiasi



(La formula!)

$$\int_1^\infty P^{-\frac{d-2}{2}}_{-\frac{1}{2}+i\kappa}(u)\, P^{-\frac{d-2}{2}}_{-\frac{1}{2}+i\nu}(u) P^{-\frac{d-2}{2}}_{-\frac{1}{2}+i\lambda}(u)(u^2-1)^{-\frac{d-2}{4}}\, du =$$

$$= \frac{\prod_{\epsilon,\epsilon',\epsilon''=\pm 1} \Gamma\left(\frac{d-1}{4}+\frac{i\epsilon\kappa+i\epsilon'\nu+i\epsilon''\lambda}{2}\right)}{\left[\prod_{\epsilon=\pm 1}\Gamma\left(\frac{d-1}{2}+i\epsilon\kappa\right)\right]\left[\prod_{\epsilon'=\pm 1}\Gamma\left(\frac{d-1}{2}+i\epsilon'\nu\right)\right]\left[\prod_{\epsilon''=\pm 1}\Gamma\left(\frac{d-1}{2}+i\epsilon''\lambda\right)\right]}$$

Wormholes attraversabili

K-essenza

$$L = R + F(X) \qquad X = g^{\mu\nu}\,\partial_\mu\varphi\,\partial_\nu\varphi$$

$$T_{\mu\nu} = F_X\,\partial_\mu\varphi\,\partial_\nu\varphi - \frac{1}{2}\,F\,g_{\mu\nu}$$

$$F(X) = (g^{\mu\nu}\partial_\mu\varphi\,\partial_\nu\varphi)^\gamma$$

$$p = w\rho = \frac{1}{2\gamma - 1}\rho$$

K-essenza - Il gas di Chaplygin

$$F_C = -2\sqrt{1 - g^{\mu\nu}\partial_\mu\phi\partial_\nu\phi}$$

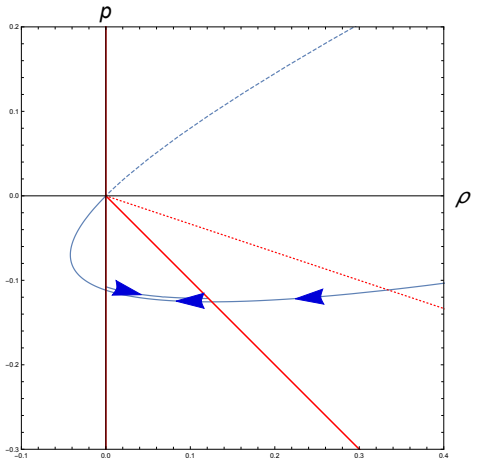
$$p = -\frac{1}{\rho} = -\sqrt{1 - X}$$

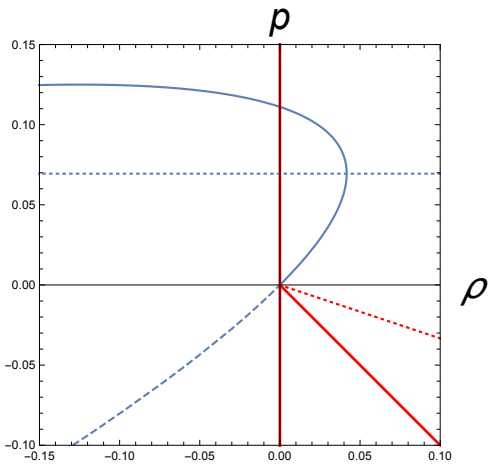
$$\rho = -\frac{1}{p} = \sqrt{1 + \frac{1}{a^6}}$$

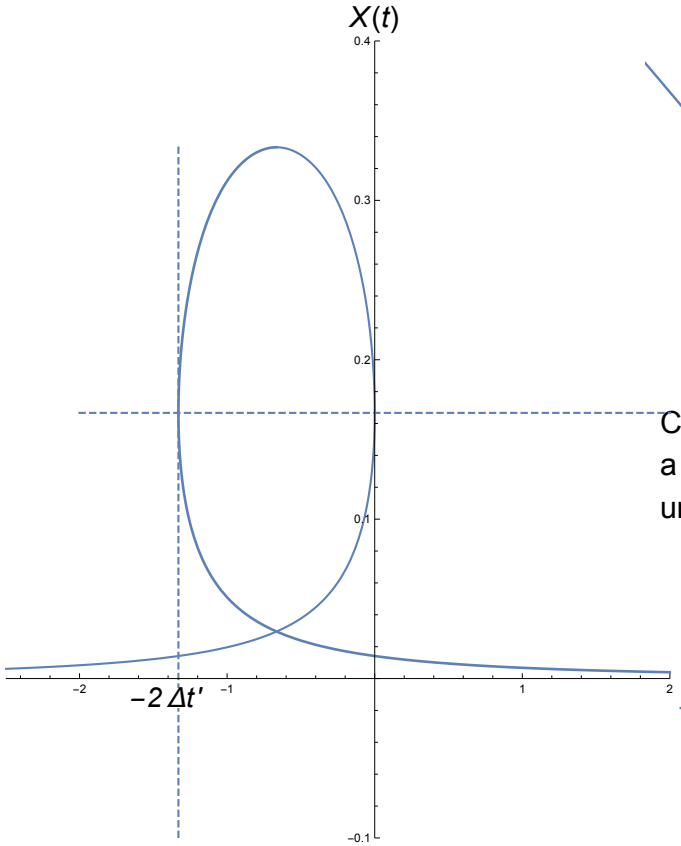
$$ds^2 = dt^2 - a^2(t)\left(dx^2 + dy^2 + dz^2\right)$$

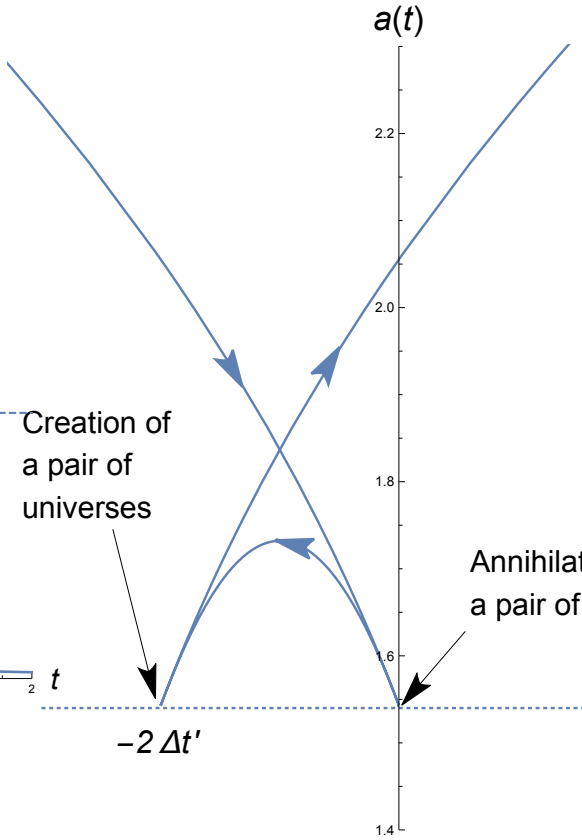
K-essenza - modello quartico

$$F = -\Lambda + \mu(\partial\varphi)^2 + \lambda(\partial\varphi)^4$$









Soluzioni esatte Skyrmioniche

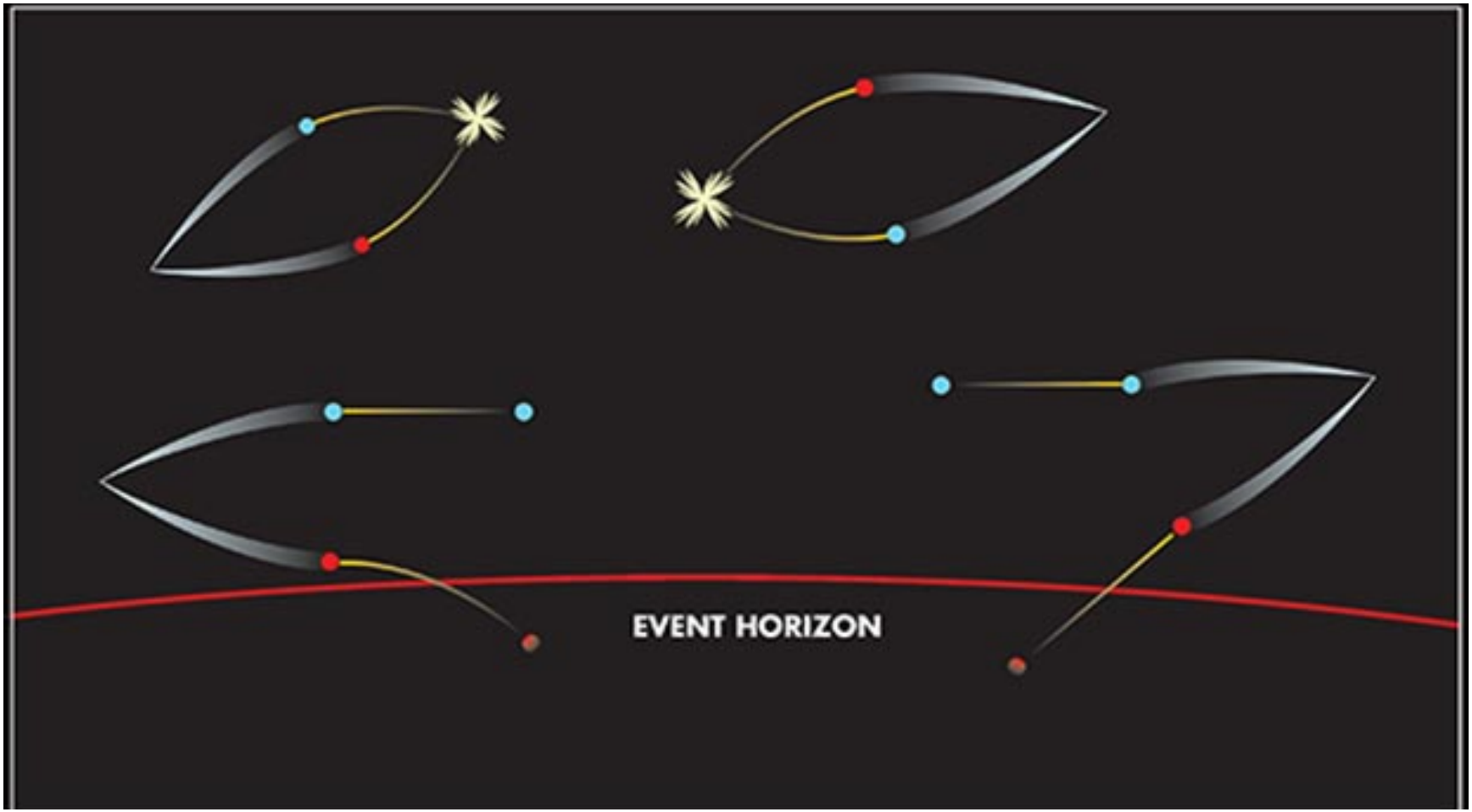
$$S = \frac{1}{4}\int d^4x\sqrt{-g}\ \mathrm{tr}\ (R^\mu R_\mu + \frac{\lambda}{8}F_{\mu\nu}F^{\mu\nu})$$

$$R_\mu = U^{-1}\partial_\mu U$$

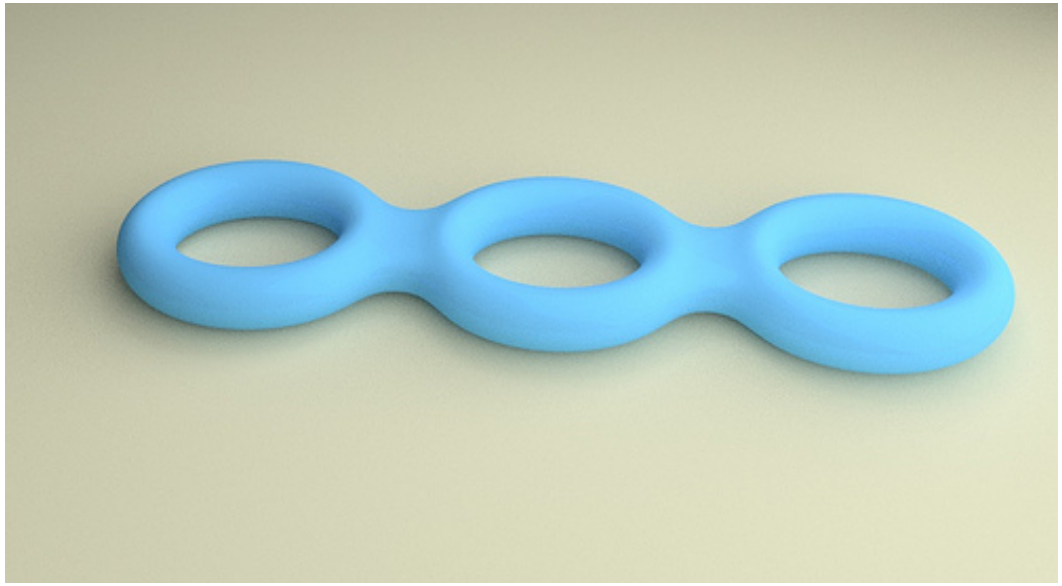
$$U \in SU(N)$$

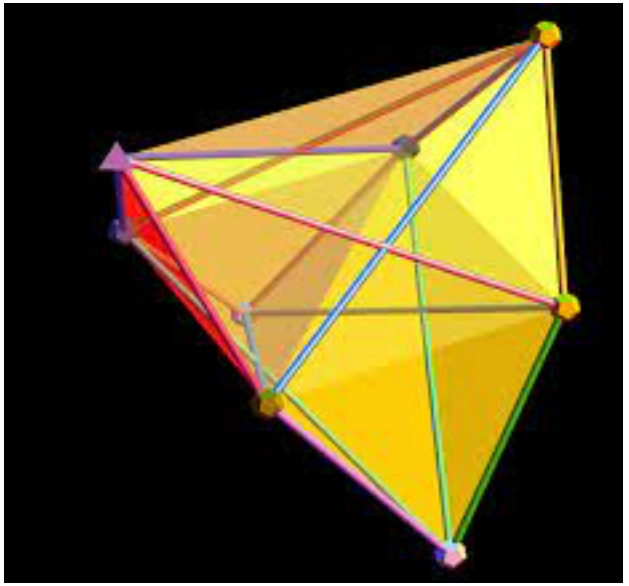
$$F_{\mu\nu} = [R_\mu, R_\nu]$$

Radiazione di Hawking

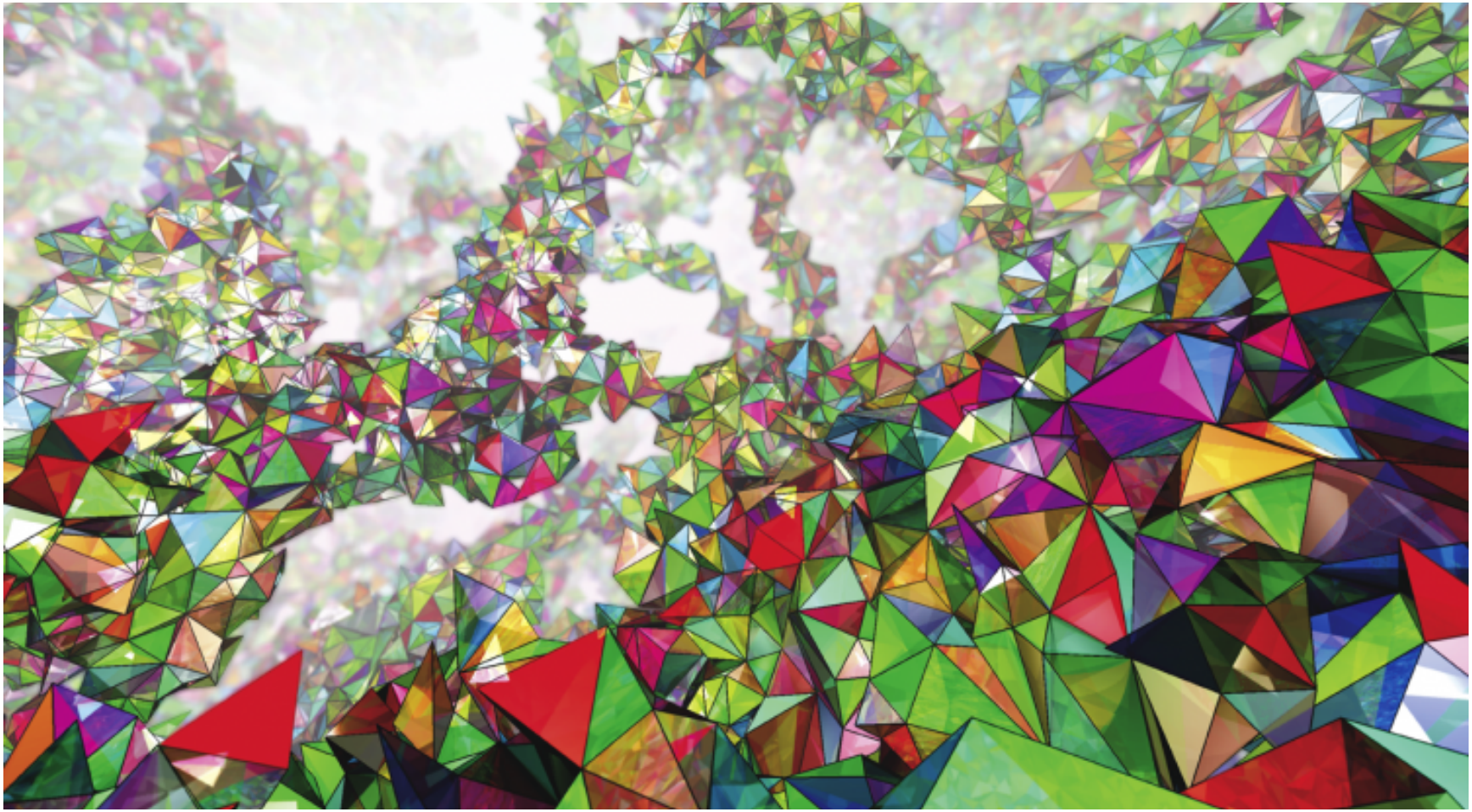


Ampiezze





Cosmologia quantistica



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