

### «ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

#### INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS «MAURICE M. SHAPIRO»

### 22<sup>nd</sup> Course: "From cosmic particles to gravitational waves: now and to come" 30 July – 7 August 2022

PRESIDENT AND DIRECTOR OF THE CENTRE: PROFESSOR A. ZICHICHI

DIRECTORS OF THE COURSE: PROFESSORS J.P. WEFEL, T. STANEV, J.R. HÖRANDEL

# WELCOME!



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According to legend, Erice, son Neptune, founded a small town on top of a mountain (750 the tres above sea level) more than three thousand years ago. The founder modern history - i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes - the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: "After the fall of Troy some Trojans on their escape from the Achaei on the sea towards the West arrived in Sicily by boat and as they settled near the border with the Sicanians all together they were named Elymi: their towns were Segesta and Erice". This inspired Virgil to describe the arrival of the Troyan royal family in Erice and the burial of Anchise, by his son **Ener**, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems.



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During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the **Cast**le of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Calledral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian) and Selinunte (Greek). On the Aegadian Islands –theatre of the decisive naval battle of the first Punic War (264-241B.C.) – suggestive incolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo. Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Comino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

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	35; 32	30	27	25 23 26 24 2 21 2	2120 1 18 10 19	17 4 14	
	2 Jeremy Lloyd-Evans	3 Ray Wills?		8 9	10 6J. Kempler	Janet Luhmann	8 Kostas (Greek.

9 Ellen Zweibel	10 G. Erdös (?)	11 Vie Stenger
17 Juan Sequiros	18 Carmen Baiseras	19
25	26 Javiev Ottaola	27
33	34	35 Rein Silver
41	42 Reinhard Schlickeiser	43
49 Piero Galeotti	50 Harm Moraal	51
57 Todor Staney	58 John Cooper	59 Simon Swo
65 Subir Sarkar	66 Arnold Wolfendale	67

INTERI Cosmic Supernc Prospec Explosi Physics 21<sup>st</sup> Cer

r	12 Jorge Perez-
	Pereza
	20 Maria Giller
	28 Helina Bilokon
rberg	36
	44 T. Gregory Guzil
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ordy	60 Steve Jordan
	68 Alan Watson

	13 Yves David
	21 G. Siegmon 29
k	37 Oscar Saavedra 45
	53 John Simpson? 61 69

6 J. Kempler	7 Janet Luhmann	SKostas (Greek, Milan?)
14 John Clifford	15 Jake Waddington	16 Maurice Shapiro
22 Elana Ashley	23 Andy Strong ?	24 Rudolph Beaujean
30 Einar Juliusson	31	32
38 Willi Niemann	39	40
46	47 Peter Fowler	48 John Linsley
54 Fred Reines 62 Reuven Ramaty	55 David Schramm 63	56 Roger Bussard 64 J C Carvalho



ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CUP TO THE PORT INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS (MAURICE M. SHAPIRO» 22<sup>--</sup> Course: "From cosmic particles to gravitational waves: now and to come" 30 July – 7 August 2022

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## announcement board for our school

another board is in San Domenico (main lecture hall) please consult these boards regularly





INTERNATIONAL SCHOOL OF COSMIC RAY ASTROPHYSICS «MAURICE M. SHAPIRO» 22nd Course: From cosmic particles to gravitational waves: New and to come Directors: J.R. HÖRANDEL – T.S. STANEV – J.P. WEFEL 30 July – 7 August 2022

ETTORE MAJORANA FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

### RESTAURANTS

HOTEL ELIMO HOTEL MODERNO POSTALE 17 IL CASALE ERICINO LA PRIMA DEA MASSIMO RISTORANTE SFIZIAMO VENUS ULISSE SAN ROCCO <u>Closed on</u> Tuesday

Wednesday Monday-Tuesday Wednesday Tuesday Monday

Thursday Wednesday

DRINKS (Mineral Water, Wine, Coffee, etc.) ARE NOT INCLUDED and must be paid by participants

Participants staying at the Eugene P. Wigner Institute (San Francesco), Patrick M.S. Blackett Institute (San Domenico) and Isidor I. Rabi Institute (San Rocco) Institutes may have breakfast at the Isidor I. Rabi Institute from 07.20 cm to 20.20

# Meals

- Order from School menu
- Wear your badge
- Sign the list before you leave (cosmic ray astrophysics)
- Pay for your bottled water, wine, coffee, soft drinks and any extras.



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# After you have finished your lunch/dinner the waiter will bring a form you to sign.

### There may be other Schools, so please make sure you sign the "Astrofis of the source o



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# **Payments**

### If you have not yet paid, please see Alexandro in **EMFCSC** secretariat

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### He will also issue receipts for payments



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# Cetrificate di attendance Some of you main need letters to confirm your attendance at the your institution

-> contact Jör Hörandel

(ideally contact me tomorrow or the day after)

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# school for your diministration at

Jörg R. Hörandel, ISCRA Erice 2022



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INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS

### **Your Badge**

### Please wear your

- Gives you access the institutes
- Is necessary for meals in the restaurants
- Can get you a 10% discount in many shops
- Allows us, the state know who you are
- Helps you to get to how each other

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# • breakfast in hotel of the standard of the st

• lunch & dinner in the restaurants

# • in the evening: information of the sector of the sector

one of the directors needs to be present to open room

absolute silence after 24:00



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# Facilities at the Ethore Majorana Centre

- Dirac Lecture Hall in San Domenico
- WiFi is available
- Secretariat is on the lower level of San Rocco
- Washers/Dryers available (right of secretariat)
- Piano room for informal gatherings (left of secretariat)
  - the casks of Marsalla for you to enjoy
- Breakfast/Snack room at bottom of stairs coffee, tea, water, sand iches, fruit, biscuits
- Courtyard for meetings discussions



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WI-FI connection at the "Ettore Majorana" Foundation and Centre for Scientific Culture

# ssid EMFCSC

Password

# 3r1c32021!



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# Getting "LOST" in the rice

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• Easy to do, espected ally after dark •You are currently and the state of the stat

- •Sooooo, when in doubt, walk UP-hill and you will eventually get back here
- •There is a watchman on duty at the front door 24 hours a day of the forman of the formation of the formatio



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### Excursion Of August 3rd

### please sign up for the excursion (a.s.a.p.) and specify dietary requirements

# bring Sun protection (Sun screen), hat

# we will be outside in the Sun the complete day

### we will go to the beach (swimsuit)









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# In case of question and the set of the set o



Jörg Hörandel

# OL ORANGE Control of the Line of the Line

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### 00 39 7890 638 035 Arthur Smith

Ur Smith Jörg R. Hörandel, ISCRA Erice 2022

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# Ground-based Gamma array of the second array o

# Gamma Ray Astronomic Office Of







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### **Cosmic rays at the knee and the GRAPES experiment Sunil Gupta**





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### Cosmic Neutrinos and Multimessenger Astronomy Francis Halzen

### **Gravitational Waves Patricia Schmidt**







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### Magnetic-Rigidity Spectrometers: Essential tools for Cosmic-Ray research John Mitchell

Cosmic rays at GeV–TeV energies and the Calorimetric Electron Telescope (CALET) Nicholas Cannady







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### Introductions

- Let's go around the room and everyone give your name and where you are from
- And say just a word about your work / interests



1980 • Composition and Origin of ite Radiation - 1988 • Cosmic Rays, minum in Astrophysics: Problems and cosmology - 2002 • Neutrinos and tergies - 2008 • Astrophysics in the eray and Neutrino Astrophysics in the	«ETTOR	EE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CUMPAGE INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS (MAURICE M. SHAPIRO) (* Astrophysics and Cosmic Radiation - 1988 • Composition and (* Astrophysics and Cosmic Radiation - 1988 • Composition and (* Astrophysics and Cosmic Radiation - 1988 • Composition and (* Otherwidthe Milleminium in Astrophysics and Cosmology - 2003 • Astrophysics and Cosmic Radiation - 1988 • Cosmic Radiation	22- Course: "From cosmic particles to gravitational waves: now and to co 30 July – 7 August 2022 PRESIDENT AND DIRECTOR OF THE CENTRE: PROFESSOR A. ZICHICHI DIRECTORS OF THE COURSE: PROFESSORS J.P. WEFEL, T. STANEV, J.R. HÖRANDEL	me"
in Nature - and Cosm 1 the Mille rsics and C ond EeV E e, Gamma	09:00	Opening	Jörg Hörandel	
articles i ma Rays Towart Astrophy V to bey Particl		Erice, Sicily, Italy	09:00 - 09:15	
1978 Acceleration of P ys - 1986 Cosmic Gamm gy Astrophysics - 1994 • m - 2000 - Relativistic. Uophysics: From below Ge Energy Universe - 2014 •		Historical introduction - basic properties of cosmic rays	Jörg Hörandel	
hysics - smic Ray igh Ener Radiatic Ray As i Ray As he High 018	10:00	Erice, Sicily, Italy	09:15 - 10:15	1
Problems in Cosmic Ray F nesis and Propagation of Co yr - 1992 • Currents in H High Energy Particles and • Gamma Ray and Cosmic cies - 2012: • Exploring L niversary of the ISCRA - 2		Ground-based Gamma-ray Astronomy with Imaging Air Cherenkov Telescopes	Christian Stegmann	
t ● Ge 20smolog 20smolog 20smolog 20smolog 20smolog 20smolog 2006 - 2006 - 2000 - 200	11:00	Erice, Skilly, Italy	10:15 - 11:15	
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PHYSIC Astroph Astroph Astro Ultra-hig ew Era i ew Era i		Erice, Sicily, Italy	11:15 - 11:45	
ASTRC mporary Particle - 1998 - hysics at by, toda		Magnetic-Rigidity Spectrometers: Essential tools for Cosmic-Ray research	John Mitchell	
NAL. SCHOOLS OF COSMIC-RAY 1982. Cosmic Radiation in Conte d the Interstellar Medium - 1990. • 6 New Visita in Aarophysics is in the Universe - 2010. • Astrophysics inderground to Outer Space - 2010 016 • Astroparticle Physics: yesterd	12:00	Erice, Sicily, Italy	11:45 - 12:45	
RNATIOP ic Rays - J novae, and ects - 1994 sive Event ss: From U entury - 24	13:00	lunch		
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		INTERNATIONAL SCHOOL OF COSMIC-RAY ASTROPHYSICS	30 July – 7 A	August 2022
SALWEIDS HOUSE		«MAURICE M. SHAPIRO»	PRESIDENT AND DIRECTOR OF THE CENTRE: PROFESSOR	A. ZICHICHI
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Particles in Nature - 1980 • Composition and Origi ma Rays and Cosmic Radiation - 1988 • Cosmic R - Toward the Millennium in Astrophysics: Problems Astrophysics and Cosmology - 2002 • Neutrinos Vio beyond Ey-Energies - 2008 • Astro & Particle, Particle, Gamma-ray and Neutrino Astrophysics in		Particles in Nature - 1980 • num Rays and Cosmic Radiat To Rays and Cosmolog A strophystics and Cosmolog eV to beypotics and Earergias- Particle, Gamma-ray and	mai	n lecture hall
celeration of ] Cosmic Garr ics - 1994 ● Relativistic om below Ge srse - 2014 •		Erice, Sloily, italy	13:00 - 15:00	
ay Physics - 1978 Acc fCosmic Rays - 1986 A in High Energy Astrophysi and Radiation - 2000 A smic Ray Astrophysics: Fr ing the High Energy Univer- ing the High Energy Univer- a - 2018	15:00	Ganama Ray Astronomy with EAS arrays	Jordan Goodman	
Cosmic J pagation c Currents y Particles ay and C ay and C the ISCR		Erice, Sicily, Italy	15:00 - 18:00	
<ul> <li>Progress and Problems in - 1984 Genesis and Pro- and Cosmology - 1992 e- iand Sources of High Energy release - 2006 Gamma R ride Astrophysics - 2012 : ticle Astrophysics - 2012 : wide antiversary of www.The 40<sup>th</sup> antiversary of www.The 40<sup>th</sup> antiversary of the 40<sup>th</sup></li></ul>	16:00	Cosmic-ray Electrons at GeV-TeV energies and the Calorimetric Electron Tele	scope (CALET) Nicholas Cannady	
SICS: ophysic ophysic strophy -high E ra in Pa I tomori		Erice, Stally, italy	16:00 - 17:00	
DLS OF COSMIC-RAY ASTROPHYS smit Radiation in Contemporary Astro thar Mediation in Contemporary Astro thar Mediation in Stronblysics - 1998 Vistas in Astrophysics - 1998 Astrophysics at Ultra- to Outer Space - 2010 A New Er puricle Physics, yesterday, today, and puricle Physics, yesterday, today, and	17:00	coffee		
		Erlee, Slally, italy	17:00 - 17:30	
		Visit to museums		
SCHO SCHO Cc Interst New New the Uni rground	18:00			
ATIONAL (ays - 1982) (ae, and the (a - 1996) (a - 1996) (a - 1996) (a - 1996) (a - 1996) (a - 1996) (a - 1980) (a - 1982) (a - 1982)		Erice, Sicily, Italy	17:30 - 18:30	
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# Poster presentations

# posters will be on displaying terrace hall (roof terrace)

presenters: be around your poster

all: walk around during coff

### posters will be on displaying the coffee area of the main

### be around your poster to give explanations as needed

### walk around during coffee breaks and read the posters



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### ISCRA Modus Operandi

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- This is a School, not a solution of the presentations. [Remain a studied of the presentations. [Remain a studied of the presentations.]
- Equally important is the availability to meet with and question the senior people during meals, coffee breaks, evenings. Ask about science, yes, but also about jobs, funding, visas, conferences or other things this is your opportunity !



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### Presentations and iscussion

- Giovani takes care of the A/V equipment in the lecture hall. See him in advance if you have a question or need to trying out a presentation.
- Please use the computer at the podium. Load your talk in advance and put it on the desktop.
- Use the microphones in ask questions, but turn them *OFF* when not in a ctive use.
- We will make all slides available on indico.



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# Sharing the Facility is the second se

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- There are other Courses Workshops running simultaneously here.
- Everyone will want access to the Piano room (evenings)
- Good opportunity to mention about a different field
- Staff are 'stretched' so



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### **Reception**

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- Downstairs in Piano Room
- Two kegs of Marsala wine (sweet and dry) are available for your enjoyment
- Please mix and get acquainted
- BUT, please keep the not since some are trying to sleep.
- Tomorrow we start promptly at 9:00



### «ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE

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