



Funds and perspectives of the I-LUCE facility

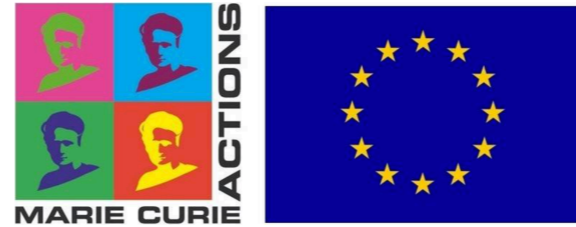
Giacomo Cuttone

Istituto Nazionale di Fisica Nucleare - Laboratori Nazionali del Sud (Italy)

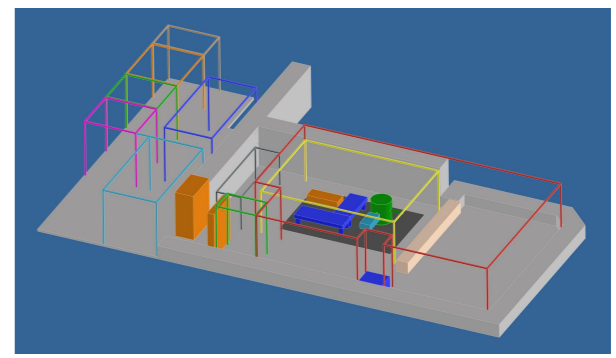
2010 Lilia (Milano, **LNS**, Frascati,)
 2013 ELIMED (**LNS**, Milano, LNL and other)
 2014 Tender ELIMED @ ELI-Beamlines (CZ)
 2016 L3IA (Milano, Pisa, **LNS** and others)
 2019 LPA2 (Milano, Pisa, **LNS** and others)
 2019 PRAGUE (ELI & **LNS**)
 2020 IMPULSE (ELI, **LNS** and others)
 2023 I-LUCE facility @ **INFN-LNS**

INFN-LNS laser related activities

ELIMED @ ELI-Beamlines (CZ)



I-LUCE @ INFN-LNS (I)



2010 Lilia (Milano, LNS, Frascati,)

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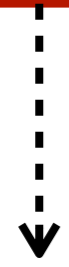
2019 LPA2 (Milano, Pisa, LNS and others)

2019 PRAGUE (ELI & LNS)

2020 IMPULSE (ELI, LNS and others)

2023 I-LUCE facility @ INFN-LNS

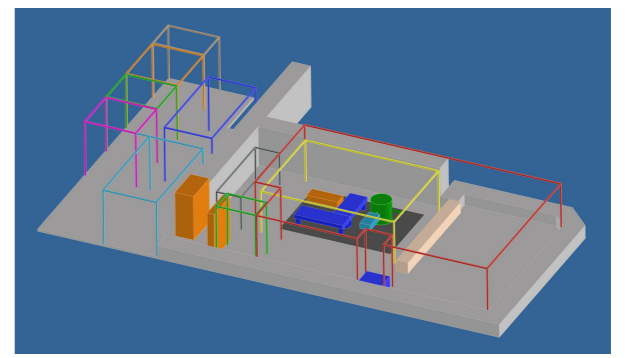
INFN-LNS laser related activities



ELIMED @ ELI-Beamlines (CZ)



I-LUCE @ INFN-LNS (I)



ELIMAIA installation in E4 (June-July 2018)

4

ELIMAIA experimental area

30J / 30fs

Protons are emitted from metallic/plastic foils μm thickness
cut-off energy of up to ~ 40 MeV.



2012



Memorandum of Understanding for a scientific and technologic
collaboration towards medical applications at ELI Beamlines

Between the

ELI-Beamlines, Institute of Physics of AS CR, public research institution (FZU),
Prague, Czech Republic

And

Laboratori Nazionali del Sud (LNS), of INFN, public research institution,
Catania, Italy

2014



- 5 DIC. 2014

Signed in Prague on 8/12/2014 Signed in Rome on _____

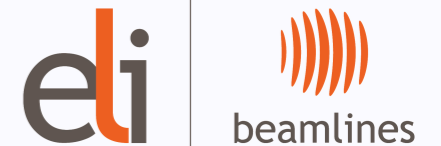
On behalf of: Fyzikální ústav AV ČR, v. v. i. On behalf of: INFN, Istituto Nazionale di Fisica Nucleare

Signature: *Jan Řídký* Signature: *Ferroni*

Name: Prof. Jan Řídký, DrSc. Name: Prof. Fernando Ferroni

Title: the Director Title: President

ISTITUTO NAZIONALE DI FISICA NUCLEARE
IL PRESIDENTE
(Prof. Fernando Ferroni)



ELIMAIA installation in E4 (June-July 2018)

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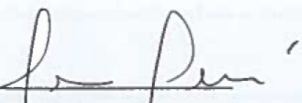
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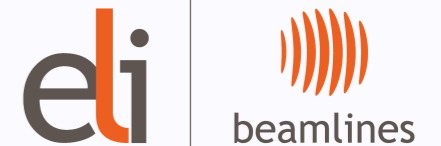
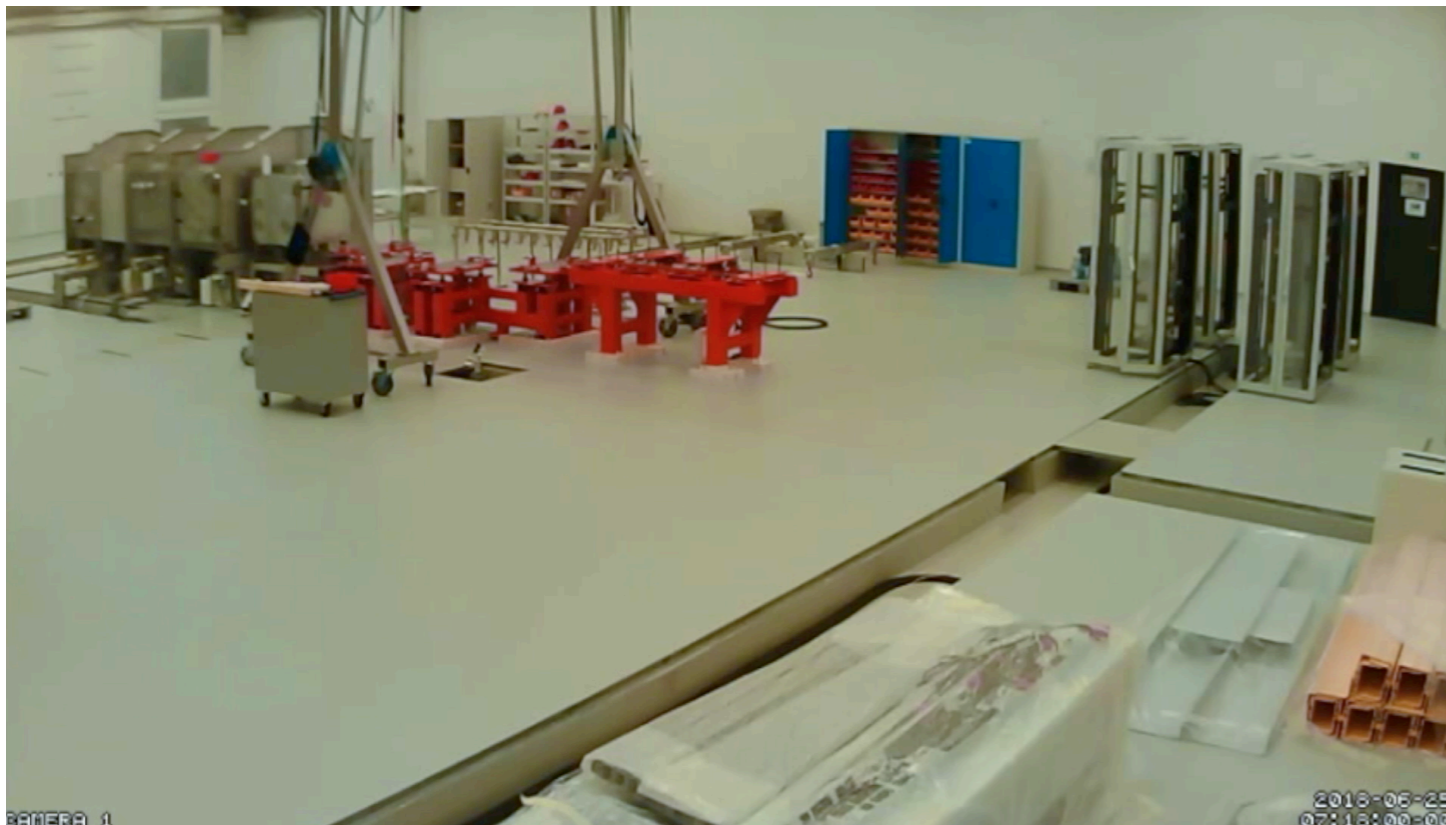
Signature:  Signature: 

Name: Prof. Jan Řídký, DrSc. Name: Prof. Fernando Ferroni

Title: the Director Title: President

IL PRESIDENTE
(Prof. Fernando Ferroni)





INFN - Laser indUCEd radiation production

The objective is to establish an operational laser facility at Laboratori Nazionali del Sud for studies in nuclear physics, plasma physics, development of new detectors, applications in medical physics, and cultural heritage.

**Linee
sperimentali**

Uffici

Laser-area

Tandem

Ciclotrone



I-LUCE (INFN Laser in UCEd radiation production), INFN-LNS, Catania (I)



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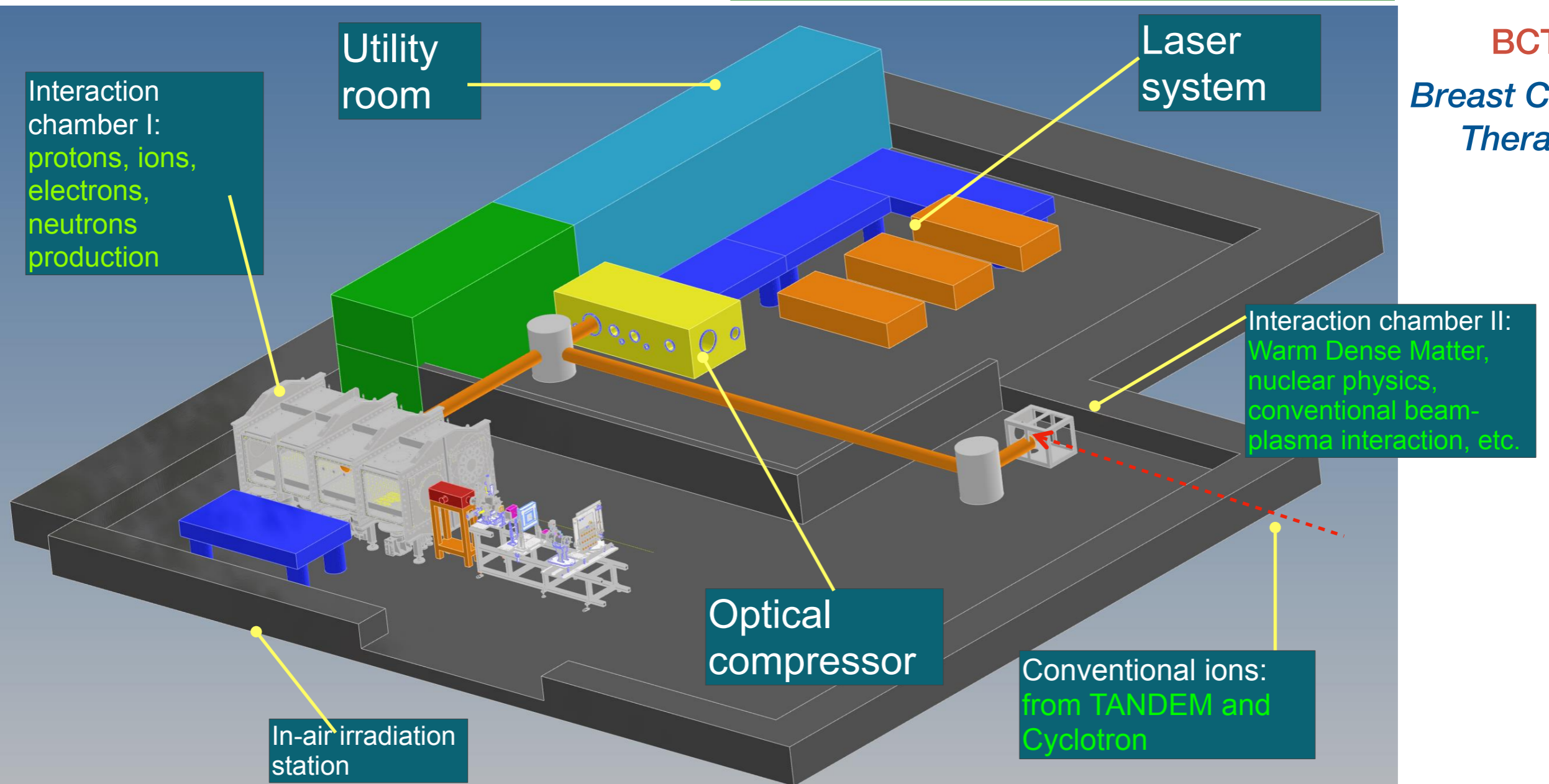
Two laser lines

45 TW, >1J/<24fs/10Hz $7 \cdot 10^{19}$ W/cm²

320 TW, >7J/<24fs/1Hz $1 \cdot 10^{21}$ W/cm²

Protons, Ions, electron accelerations; gamma, neutrons production

BCT
Breast Cancer Therapy



Quattro canali di finanziamento

8



Roma TV, LNF, Pisa CNR, LNS
15 M€

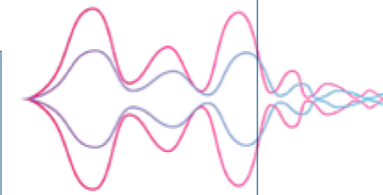


7.9 M€ **WP3 High-Power lasers**

Infrastruttura

Sistema laser e camere interazione

Accelerazione di protoni ed elettroni



Anthem

Advanced
technologies for
Human Centred
Medicine

23 Istituti; Spoke 4: Caserta, Pavia, INFN

1.3 M€

Ottimizzazione nell'accelerazione di
elettroni e UHDR



0.8 M€

Ottimizzazione nell'accelerazione di
protoni e ioni

BCT

Breast Cancer Therapy

2.0 M€

Ottimizzazione nella selezione
di fasci di protoni per
applicazioni mediche

EUPRAXIA Advanced Photon Sources (EUAPS)

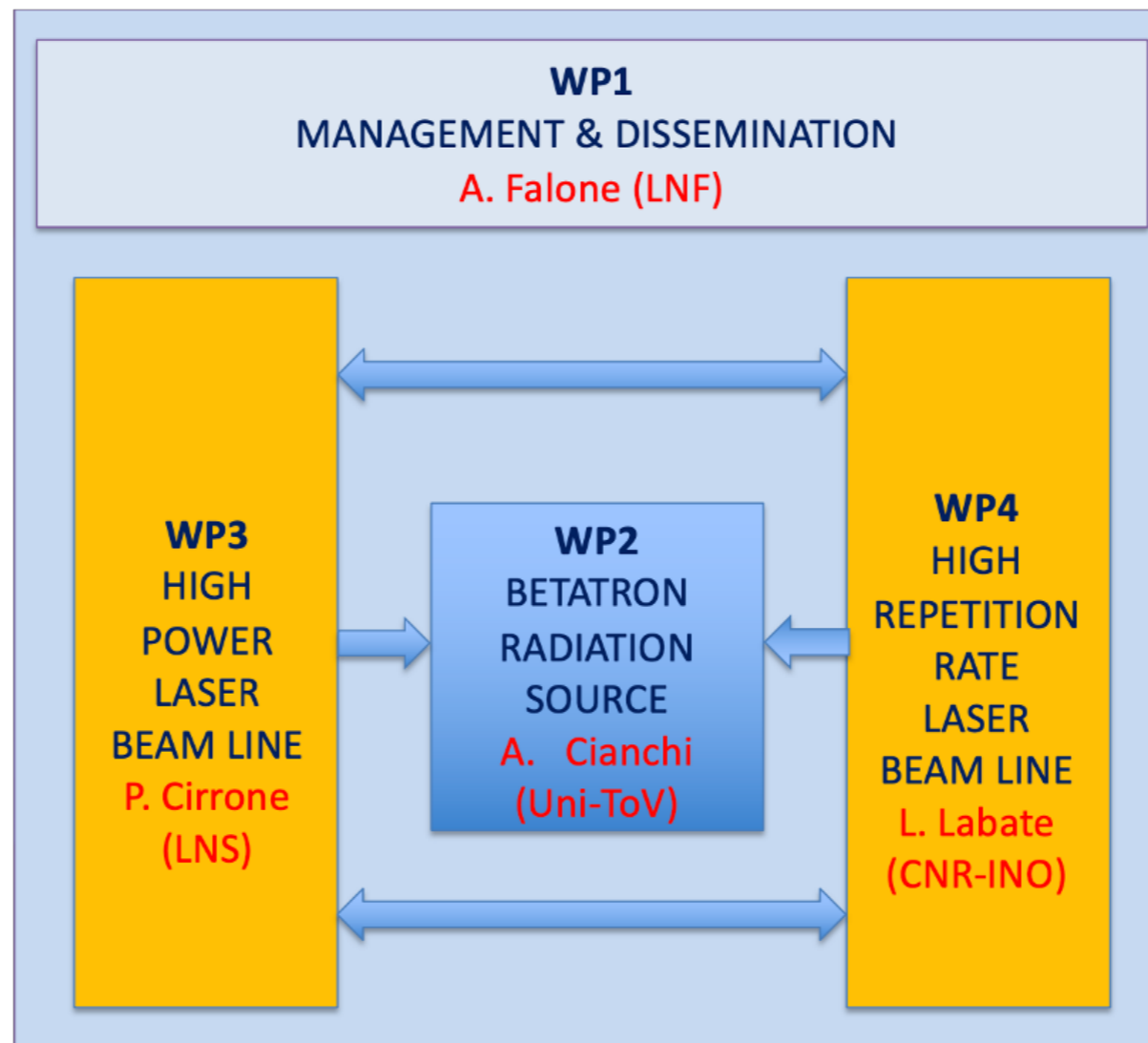
9

EuAPS Scientific Coordinator:
M. Ferrario (INFN-LNF)
EuPRAXIA/EuAPS Integration:
R. Assmann (DESY & INFN)



LNF-LNS-MI

INO-ISM



Scientific Advisory Committee

Operating Units Board

Scientific and Technical Board

EUPRAXIA Advanced Photon Sources (EUAPS)



LNF-MI



ISM



LNS



INO

COSTS (€) WORK PACKAGE [WP.2 - Betatron Radiation Source]			
	Costs included in the request for funding		
	To be located within the eight southern Regions	To be located outside the eight southern Regions	Total requested grant
a. Fixed term personnel specifically hired for the project	120.000,00	878.000,00	998.000,00
b. Scientific instrumentation and technological equipment, software licenses and patent	1.000.000,00	6.840.400,00	7.840.400,00
c. Open Access, Trans National Access, FAI principal implementation	0,00	0,00	0,00
d. Civil infrastructures and related systems	0,00	0,00	0,00
e. Indirect costs, including running costs	78.400,00	540.288,00	618.688,00
f. Training activities	0,00	0,00	0,00
Total	1.198.400,00	8.258.688,00	9.457.088,00

COSTS (€) WORK PACKAGE [WP.3 - High Power Laser Beam Line]			
	Costs included in the request for funding		
	To be located within the eight southern Regions	To be located outside the eight southern Regions	Total requested grant
a. Fixed term personnel specifically hired for the project	150.000,00	0,00	150.000,00
b. Scientific instrumentation and technological equipment, software licenses and patent	5.917.812,47	0,00	5.917.812,47
c. Open Access, Trans National Access, FAI principal implementation	0,00	0,00	0,00
d. Civil infrastructures and related systems	1.300.006,38	0,00	1.300.006,38
e. Indirect costs, including running costs	496.681,15	0,00	496.681,15
f. Training activities	0,00	0,00	0,00
Total	7.864.500,00	0,00	7.864.500,00

COSTS (€) WORK PACKAGE [WP.4 - High Repetition Rate Laser Beam Line]			
	Costs included in the request for funding		
	To be located within the eight southern Regions	To be located outside the eight southern Regions	Total requested grant
a. Fixed term personnel specifically hired for the project	0,00	240.000,00	240.000,00
b. Scientific instrumentation and technological equipment, software licenses and patent	0,00	4.024.986,00	4.024.986,00
c. Open Access, Trans National Access, FAI principal implementation	0,00	0,00	0,00
d. Civil infrastructures and related systems	0,00	280.000,00	280.000,00
e. Indirect costs, including running costs	0,00	318.164,00	318.164,00
f. Training activities	0,00	0,00	0,00
Total	0,00	4.863.150,00	4.863.150,00

Tasks

T3.1 Clean room realization

T3.2 Laser design and realization

T3.3 Target system for high repetition rate (up to 10 Hz)

T3.4 Plasma Diagnostics

T3.5 Secondary beam diagnostic

Fixed term personnel	150.000 €
Scientific instrumentation and technological equipment	5.900.000 €
Civil infrastructures and related systems	1.300.000 €
Indirect costs, including running costs	514.500 €
Training activities	0,00
Total	7.864.500 €

12 Leader INFN-LNS unit: Pablo Cirrone



HUB Leader Mi-Bicocca

*Spoke 4 (Leader UniCT)
Innovative radiotherapy techniques and
imaging
(Flash therapy & BNCT)*

INFN Units: CT, LNL, LNS, NA, PV, TO

Pilot 4.4: Preclinical Studies of Flash
and Ultra-flash therapy at Catania.

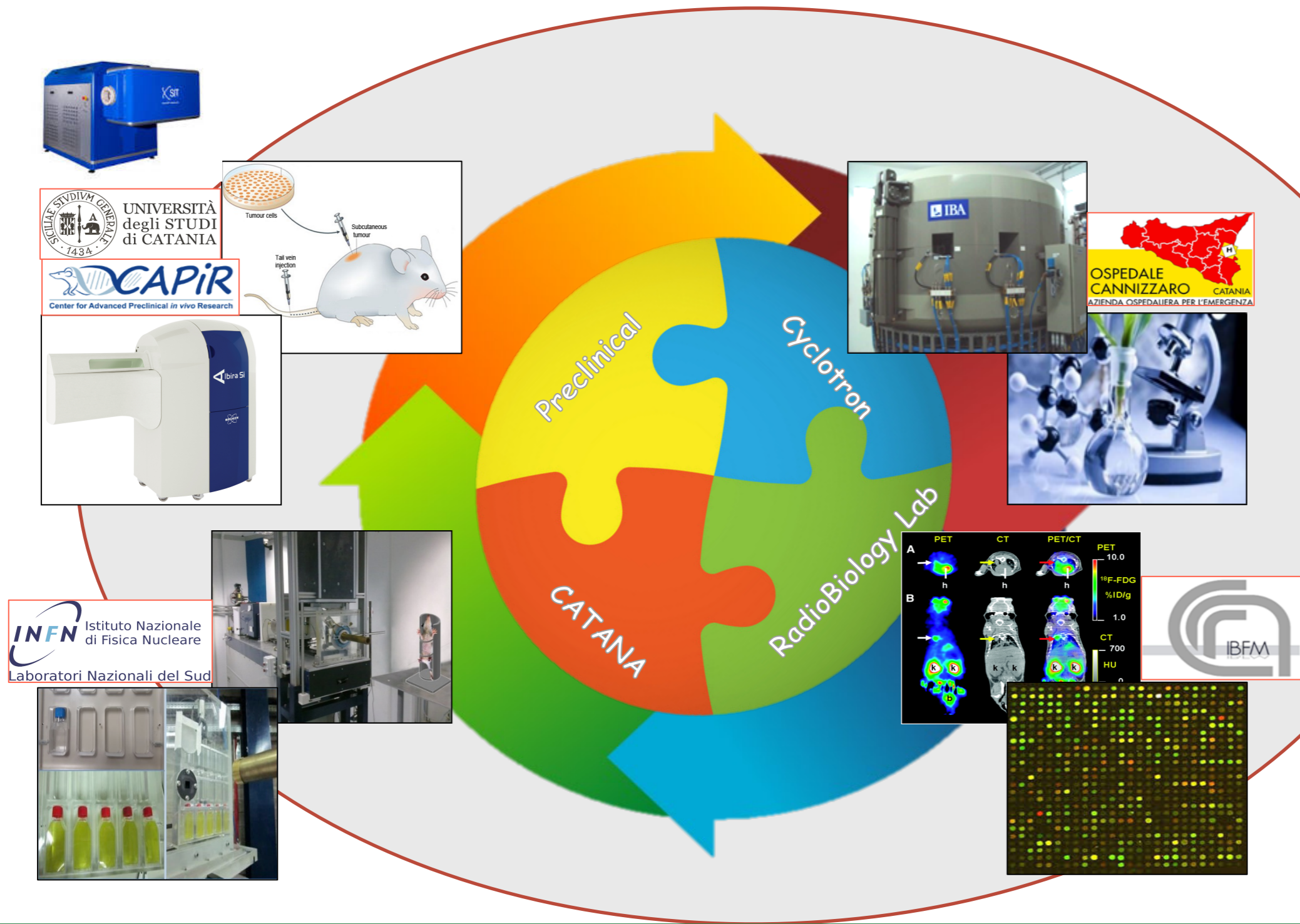
INFN: LNS, Catania & Pavia
Flash Therapy Study based on SIT
Linac at Unict-Capir and Ultra Flash
Therapy based on laser Plasma
Acceleration at INFN-LNS



Università
di Catania



THE UNIQUE NATIONAL NETWORK PROVIDING RESEARCH AND SERVICE ACTIVITY IN THE PRECLINICAL IMAGING, HADRONTHERAPY, FLASH AND ULTRA-FLASH THERAPY



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA



PNC

Piano nazionale per gli investimenti
complementari al PNRR
Ministero dell'Università e della Ricerca



SAMOTHRACE

14 Leader INFN-LNS unit: Salvatore Tudisco

SPOKE 5

WP1 - Micro accelerators for health and energy applications

WP4 - Micro detectors for particle therapy, dosimetry e micro-dosimetry

Realisation of an irradiation station with laser-driven high-energy proton and electron beams with innovative nano-structured material



Future Upgrading and Funds

15

Life Science programs with Po-Fesr 21-27 Regione Sicilia

Pianoforte Platform

EU funds for inertial fusion in Horizon Europe Euratom

Euratom Program

National Funds for Fusion program

Fateme Farokhi
Roberto Catalano
Alberto Sciuto
Alfio Pappalardo (EUAPS)
Davide Passarello
Daniele Rizzo
Luigi Raffaele
Giuseppe Angemi (BCT)
Pablo Cirrone
Mariacristina Guarrera

Antonino Amato
Carmelo Manna
Enrico Caruso (BCT)
Giovanni Cantone (BCT)
Orsola Giampiccolo (BCT)
Demetrio Oliva (ANTHEM)
Giada Petringa (EUAPS)
Francesco Cammarata
Giacomo Cuttone
Alma Kurmanova

Sahar Arjmand
Giorgio Russo
Carmen Altana (SAMOTHRACE)
Salvatore Tudisco
Alessandro Pizzino (BCT)
Salvatore Pulvirenti
Jose Suarez (ANTHEM)
Serena Fattori (ANTHEM)
Gustavo Messina

Thanks for listening

