

FATA 2025

FAst Timing Applications for Nuclear Physics and Medical Imaging
Catania - Italy, 8th - 10th October 2025

The second edition of FATA will be held in memory of Angelo Pagano, chair of the previous editions



Angelo Pagano is research leader at INFN and member of Physics and Astronomy “Ettore Majorana” Department-Catania University. His activity is in the field of experimental Heavy Ion Physics. He is also devoting activities in History of Physics and lecturing on Heavy Ion collisions. From 1982 till 1984 he got a contract at the Saclay-Laboratory(FR). In 1985 he got the permanent position and in 1987 he received the PHD degree (Rome). He participated in experiments at Frascati, Cata-

nia, Saclay, Ganil, GSI, to study either gammas or Heavy Ions induced reactions. In 1993 he promoted the European CHIMERA collaboration aimed to the construction of an innovative 4 device for charged particles. In 1998 he promoted the first campaign of experiments by using the forward part of CHIMERA/REVERSE detector, and later on in 2003 the CHIMERA/ISOSPIN campaign with the full apparatus. In 2001 he promoted (with B. Borderie and M. France Rivet-CNRS-IPN Orsay (FR)) the International Workshop on Multifragmentation (IWM). From 2007 till 2015 he was designated director of INFN-Catania. He is author of numerous publications and invited presentations to conferences and institutions.

In this 2020 review paper the editor asked Angelo to write, as appendix to the paper, a short presentation of his scientific activity

Eur. Phys. J. A (2020) 56:102
<https://doi.org/10.1140/epja/s10050-020-00105-z>

THE EUROPEAN
PHYSICAL JOURNAL A



Review

Nuclear neck-density determination at Fermi energy with CHIMERA detector

A. Pagano^{1,a}, E. De Filippo¹, E. Geraci^{1,3}, E. V. Pagano², P. Russotto², K. Siwek-Wilczyńska⁴, L. Acosta^{1,10}, L. Auditore^{1,8}, T. Cap⁶, G. Cardella¹, M. B. Chatterjee⁷, M. Colonna², B. Gnoffo^{1,3}, F. Favela^{1,11}, G. Lanzalone^{2,9}, C. Maiolino², N. S. Martorana^{2,3}, M. Papa¹, S. Pirrone¹, G. Politi^{1,3}, E. Piasecki⁵, L. Quattrocchi^{1,8}, F. Rizzo^{2,3}, A. Trifirò^{1,8}, M. Trimarchi^{1,8}

The start of experimentation at GANIL in the Fermi energy regime : projectile fragmentation

PERIPHERAL INTERACTIONS FOR 44 MeV/u ^{40}Ar ON ^{27}Al AND ^{nat}Ti TARGETS*

R. DAYRAS, A. PAGANO¹, J. BARRETTE, B. BERTHIER,
D.M. DE CASTRO RIZZO, E. CHAVEZ, O. CISSE, R. LEGRAIN,
M.C. MERMAZ and E.C. POLLACCO

Service de Physique Nucléaire-Basse Energie, CEN Saclay, 91191 Gif-sur-Yvette Cedex, France

H. DELAGRANGE and W. MITTIG

GANIL, BP 5027, 14021 Caen Cedex, France

B. HEUSCH

Centre de Recherches Nucléaires and Université Louis Pasteur, 67037 Strasbourg Cedex, France

R. CONIGLIONE, G. LANZANO and A. PALMERI

Istituto Nazionale Fisica Nucleare, Corso Italia 57, 95129 Catania, Italy

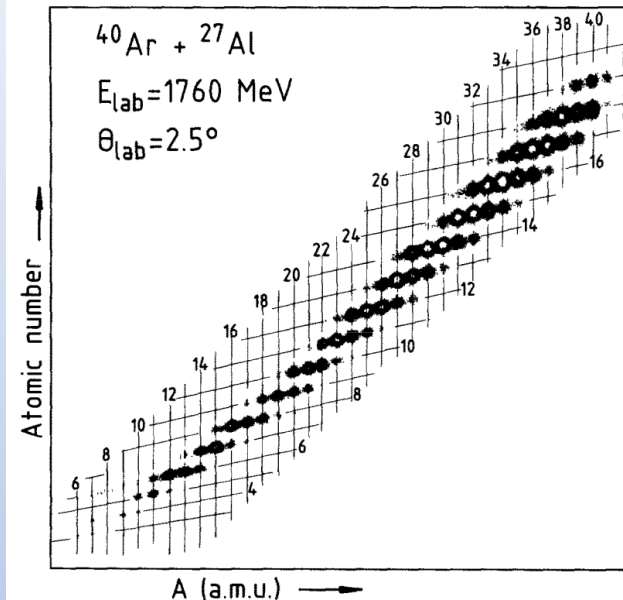
Received 11 March 1986

(Revised 24 June 1986)

Abstract: We have studied projectile-like fragments produced in the interaction of 44 MeV/u ^{40}Ar ions with ^{27}Al and ^{nat}Ti targets. The fragments were identified both by their mass and charge. Inclusive energy spectra, angular distributions, and cross sections show for both targets many of the features of high energy fragmentation. However several aspects such as the energy dissipation and the presence of direct surface transfers are reminiscent of a low energy behaviour. Many of these properties, such as the average kinetic energy of the fragments, are well reproduced by an extended version of the abrasion-ablation model which takes into account the kinematical effect of the separation energies.

Nucl. Phys. A460, 299 (1986)

R. Dayras et al. / Peripheral interactions



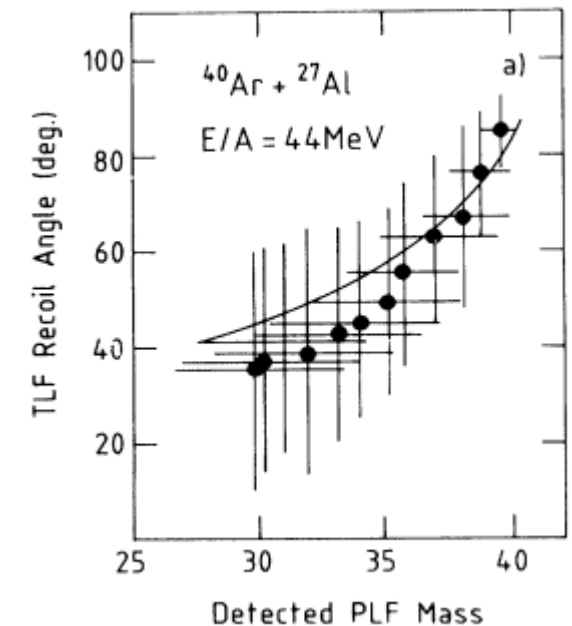
VOLUME 62, NUMBER 9

PHYSICAL REVIEW LETTERS

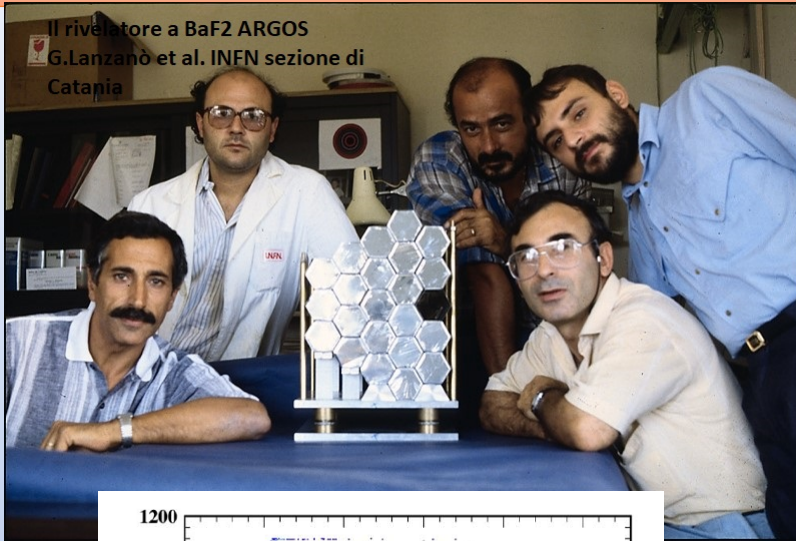
27 FEBRUARY 1989

Correlations between Projectilelike and Targetlike Fragments in the Reaction $^{27}\text{Al} + 44\text{-MeV/nucleon } ^{40}\text{Ar}$

This paper, often commented in his lectures to the students, was considered by Angelo as one of the most significative of his early activity with the Saclay group for the scientific accuracy in the method and precision of the results



The ARGOS BaF₂ + NE102A detector: more than 20 years of experiments for light particles, heavy ions and electrons detection



Nuclear Instruments and Methods in Physics Research A312 (1992) 515–520

Using BaF₂ crystals as detectors of light charged particles at intermediate energies

G. Langanó, A. Pagano, S. Urso and E. De Filippo

Istituto Nazionale di Fisica Nucleare and Dipartimento di Fisica, Corso Italia 57, 95129 Catania, Italy

B. Berthier, J.L. Charvet, R. Dayras, R. Legrain, R. Lucas, C. Mazur, E. Poliaccio, J.E. Sauvestre and C. Volant

DAPNIA / SPN CEN-Saclay, 91191 Gif-sur-Yvette Cedex, France

C. Beck, B. Djerroud and B. Heusch

Centre de Recherches Nucléaires and Université Louis Pasteur, 67037 Strasbourg Cedex, France

NIM A312 (1992), 515

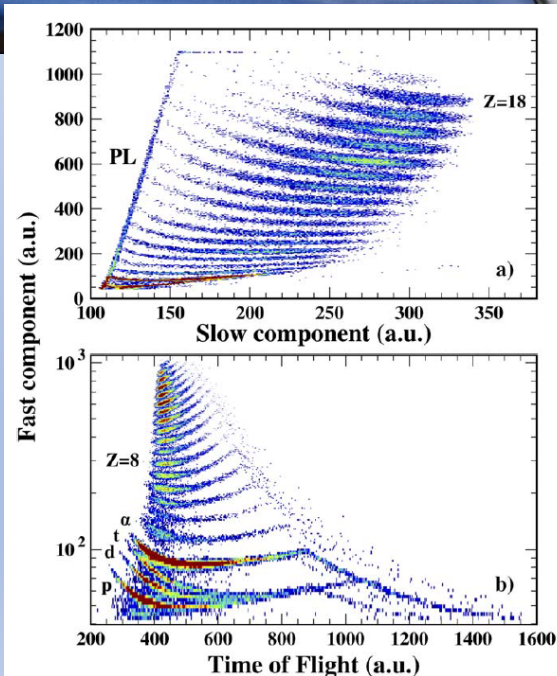
NIMA A323 (1992), 694

NIM A332 (1993), 161

NIM A342 (1994), 527

IEEE NS 56 (2009) 2519

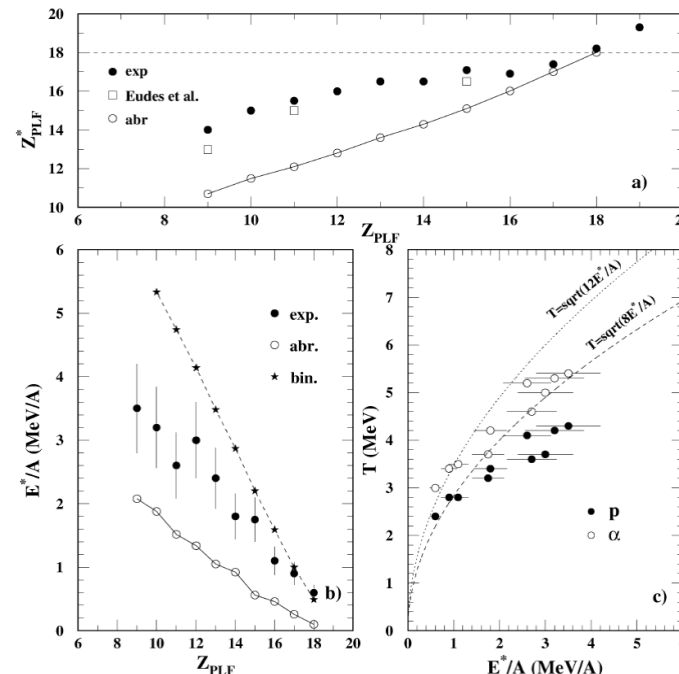
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Nucl. Phys. A733 (2006), 1-23

586

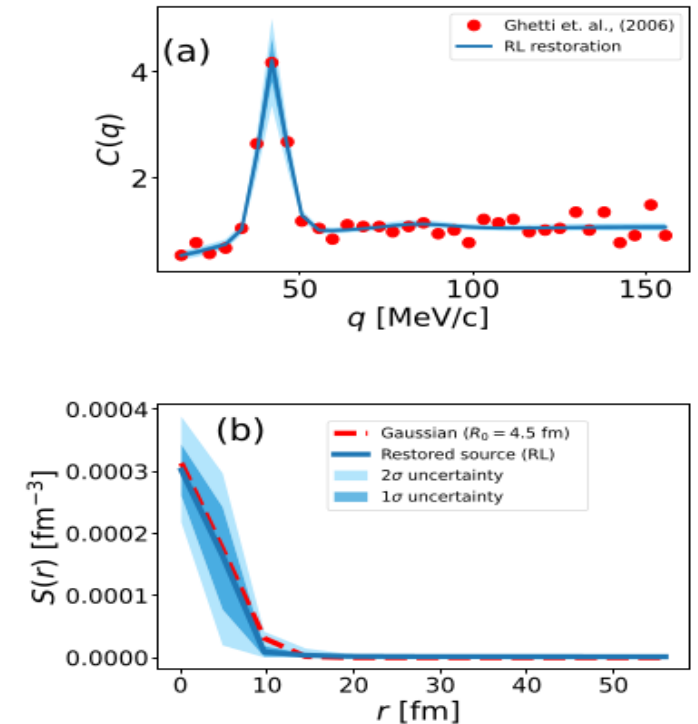
G. Langanó et al. / Nuclear Physics A 683 (2001) 566–593



Caloric curve in projectile fragmentation

P. Nzababimana and P. Danielewicz

Phys. Lett. B846 (2023), 138247



Argos, alpha-deuteron correlation data

GANIL, first experiment with the ARGOS array : $^{40}\text{Ar} + \text{natAg}$, ^{27}Al 58.7 MeV/A



Lolly (Pollacco)

Tano (Lanzanò)

Angelo (Pagano)



ARGOS

ELSEVIER

Physics Letters B 335 (1994) 300–306

Equilibrium versus non-equilibrium emission in projectile fragmentation for the $^{40}\text{Ar} + \text{natAg}$ system at 58.7 A MeV ^{*}

J.E. Sauvestre ^{a,1}, J.-L. Charvet ^a, R. Dayras ^a, C. Volant ^a, B. Berthier ^{a,2}, R. Legrain ^a,
R. Lucas ^a, E.C. Pollacco ^a, E. De Filippo ^{b,3}, G. Lanzanò ^b, A. Pagano ^b, C. Beck ^c,
B. Djerroud ^{c,4}

^a CEA, DAPNIA/SPHN, CE Saclay, F-91191 Gif-sur-Yvette Cedex, France

^b Istituto Naz. Fisica Nucleare and Dipartimento di Fisica, Corso Italia 57, 95129 Catania, Italy

^c Centre de Recherches Nucléaires, IN2P3-CNRS/Université Louis Pasteur, F-67037 Strasbourg Cedex 2, France

A complex experiment some years before CHIMERA : $^{40}\text{Ar} + ^{232}\text{Th}$ at 27, 44 and 77 MeV/A

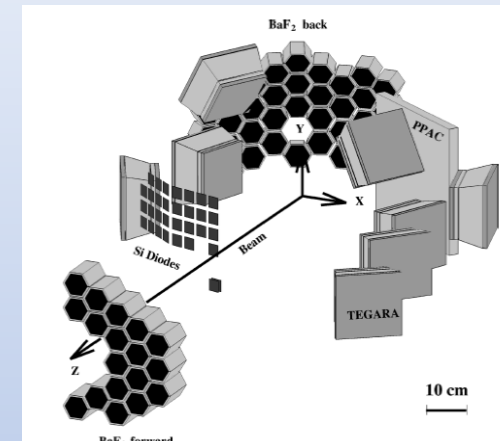
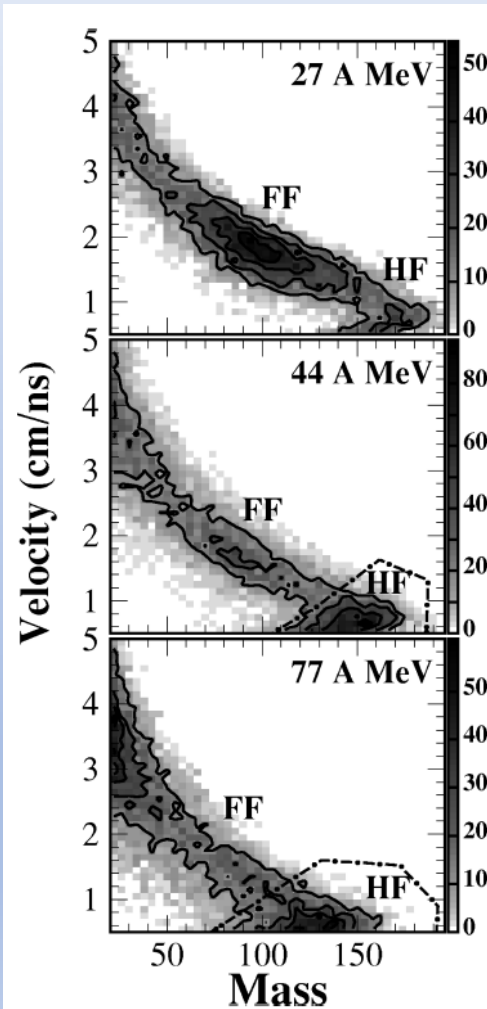
PHYSICAL REVIEW C

VOLUME 57, NUMBER 4

APRIL 1998

Heavy fragment production in $^{40}\text{Ar} + ^{232}\text{Th}$ reactions at 27A, 44A, and 77A MeV

Claude Volant



Disentangling fission fragments (FF) from heavy residues (HF) in central collisions



The CHIMERA 4 π project: a long trip started as idea (or dream) around 1992



•The CHIMERA project idea was launched by Angelo and a group of physicists of INFN sezione and INFN-LNS following the researches on multifragmentation and the needs of a second generation 4 π detector with respect to INDRA (EPJA 30, 275, (2006))

•Approved by INFN, the building phase spanned to **1994-1999** (INFN Catania, LNS, Messina, Milano). The electronic front-end was projected in synergy with the CHIMERA and INDRA group, producing new advances in Si and CsI detectors read-out. In 1997 the first ring of CHIMERA was coupled with INDRA at GANIL

•Angelo was national spokesperson of the group up to 2008. The first phase of experiments was started at LNS in 1999 (**REVERSE** experiment, 1999-2003) by using $^{124,112}\text{Sn}$ on $^{64,58}\text{Ni}$ at 35 A.MeV with the detector forward part and in the following phase with the complete detector (**ISOSPIN** experiment, 2003-2008). **The IWM conference series started in 2001.**

•It was in this period that the scientific program was pursued with the formation of a big international collaboration (over 70 researchers) converging to the LNS from Italy (Catania, LNS, Milano, Napoli, Bologna, Firenze), Europe (France, Poland, Romania) China, India, United States.





This conference was born in **2001** on initiative of **Angelo, Marie-France Rivet and Bernard Borderie (IPN Orsay)**.

It is organized about every two years alternately in France and Italy (last edition was in 2024). From the beginning, the conference Proceedings are published.

Starting with CHIMERA : the REVERSE experiment, the “magic years” 2003-2005



First papers on physics...

Nuclear Physics A734 (2004) 504–511

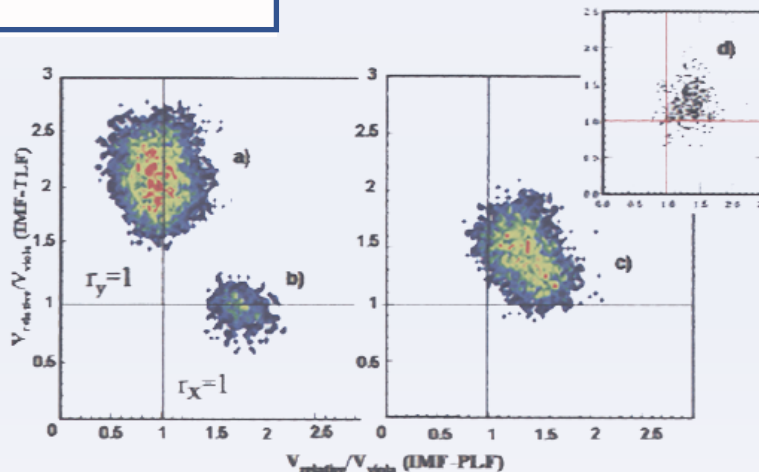
NUCLEAR
PHYSICS A

www.elsevier.com/locate/npe
NN2003 Moscow

Fragmentation studies with the CHIMERA detector at LNS in Catania:
recent progress

A. Pagano^a, M. Alderighi^b, F. Amorini^c, A. Anzalone^c, N. Arena^a, L. Auditore^d, V. Baran^c, M. Bartolucci^c, I. Berceanu^f, J. Blicharska^g, J. Brzychczyk^h, A. Bonasera^c, B. Borderieⁱ, R. Bougault^j, M. Bruno^k, G. Cardella^a, S. Cavallaro^c, M.B. Chatterjee^l, A. Chbihi^m, J. Ciborⁿ, M. Colonna^c, M. D'Agostino^k, R. Dayras^o, E. De Filippo^a, M. Di Toro^c, W. Gawlikowicz^h, E. Geraci^k, F. Giustolisi^c, A. Grzeszczuk^g, P. Guazzoni^e, D. Guinet^p, M. Iacono-Manno^c, S. Kowalski^g, E. La Guidara^c, G. Lanzano^a, G. Lanzalone^c, N. Le Neindreⁱ, S. Li^q, S. Lo Nigro^e, C. Maiolino^c, Z. Majka^h, G. Manfredi^e, T. Paduszynski^g, M. Papa^a, M. Petrovici^f, E. Piasecki^r, S. Pirrone^a, R. Planeta^h, G. Politi^a, A. Pop^f, F. Porto^c, M. F. Rivetⁱ, E. Rosato^s, F. Rizzo^c, S. Russo^e, P. Russotto^c, M. Sassi^e, G. Sechi^b, V. Simion^f, K. Siwek-Wilczynska^r, I. Skwira^r, M. L. Sperduto^c, J.C. Steckmeyer^j, L. Swiderski^r, A. Trifirò^d, M. Trimarchi^d, G. Vannini^k, M. Vigilante^s, J. P. Wieleczko^m, J. Wilczynski^t, H. Wu^q, Z. Xiao^q, L. Zetta^c, W. Zipper^g

See: A. Pagano, Nuclear Phys.
News 22, 25 (2012) for a brief
history of the REVERSE exp. and
CHIMERA at LNS and EPJA 50, 32
(2014) for a review



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Nuclear Physics A 732 (2004) 173–201

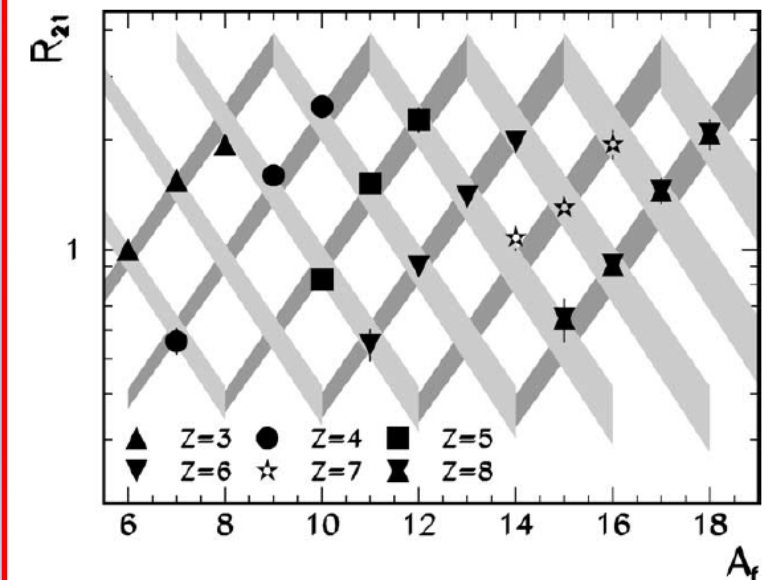
NUCLEAR
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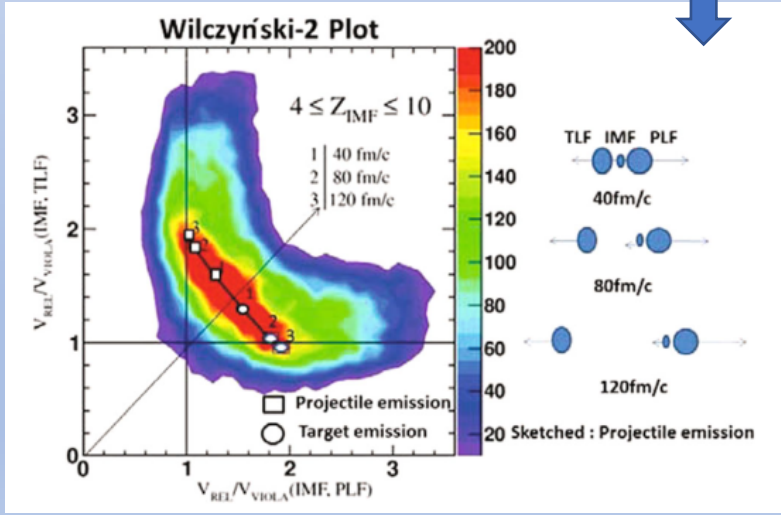
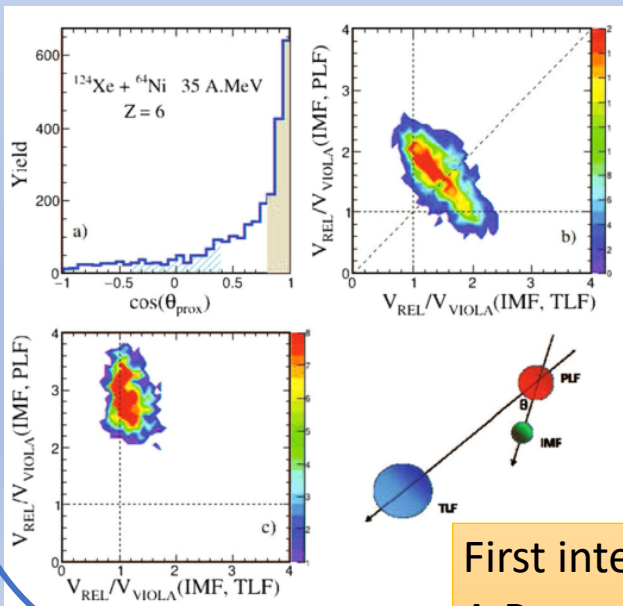
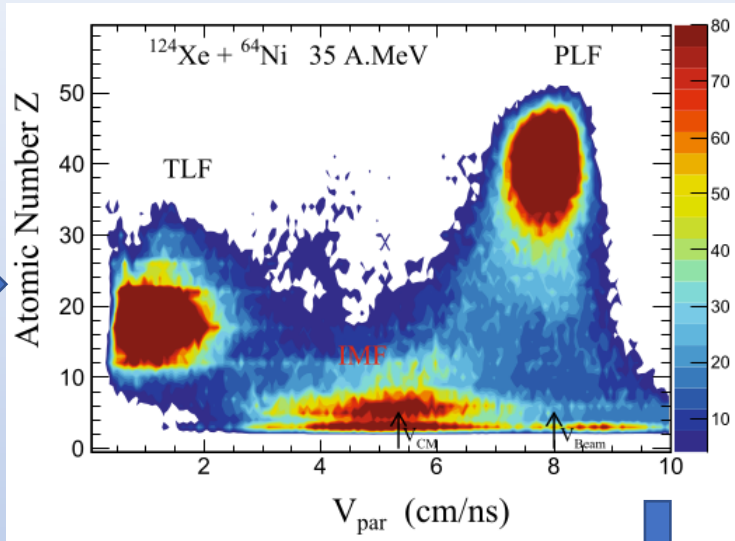
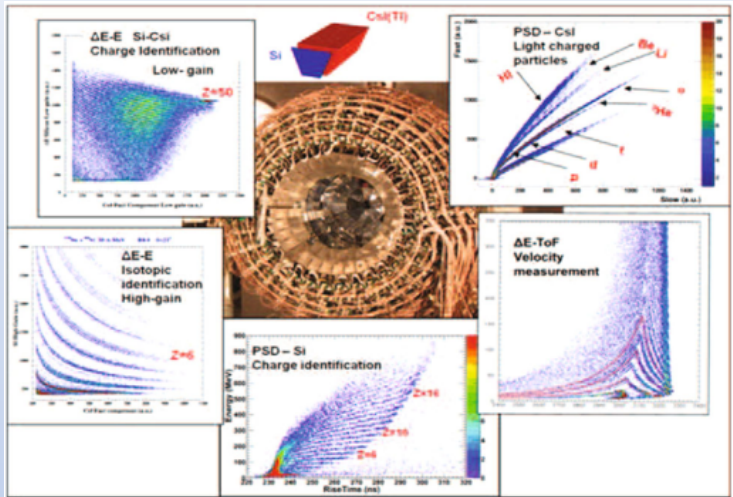
Isoscaling in central $^{124}\text{Sn} + ^{64}\text{Ni}$, $^{112}\text{Sn} + ^{58}\text{Ni}$
collisions at 35 A MeV

E. Geraci et al. / Nuclear Physics A 732 (2004) 173–201



A slide from Angelo's talk at IWM-EC 2021 (Caen) . . .

A brief history of the analysis with CHIMERA



First interpretation of this plot for $^{124}\text{Sn}+^{64}\text{Ni}$ at 35MeV/A:
A.Pagano et al. Nuclear Physics A734 (2004) 504-511

A. Pagano with J. Wilczyński



- Phys. Rev C71, 044602 (2005)
- Phys. Rev. C71, 064604 (2005)
- Phys. Rev. C81, 064605 (2010)
- Phys. Rev. C86, 014610 (2012)
- Phys. Rev. C91, 014610 (2015)
- EPJA 50, 32 (2014)
- EPJA 56, 12 (2020)
- EPJA 56, 102

(2020)
... describing the neck emission in ternary events of Chimera data

THE TIME SCALE OF NUCLEAR REACTIONS FROM DEEP INELASTIC TO PROJECTILE-TARGET FRAGMENTATION*

ANGELO PAGANO

for CHIMERA Collaboration

INFN — Division of Catania, Via Santa Sofia 64, 95123 Catania, Italy

(Received January 17, 2017)

During the last fifteen years, professor Janusz Wilczyński devoted a large part of his scientific activity to Heavy-Ion (HI) experiments performed with the CHIMERA detector in the Fermi energy domain. He was an outstanding member of the international CHIMERA Collaboration. The reaction mechanism for semi-peripheral collisions at Fermi energy was carefully examined by him and his research group in close collaboration with both experimentalists and theorists in Catania. Since the earlier pioneering works in deep-inelastic collisions, the unifying concept of Wilczyński's analysis of the experimental data has been driven by the powerful notion of one-body semi-classical deflection function. Wilczyński extended in the early 1970s the application of this concept to describe in a coherent way both the energy dissipation and the time scale evolutions of dissipative collisions. In this paper, we focus mainly on the time scale of the reaction mechanism in gentle three-body reactions between two interacting heavy ions at Fermi energy.

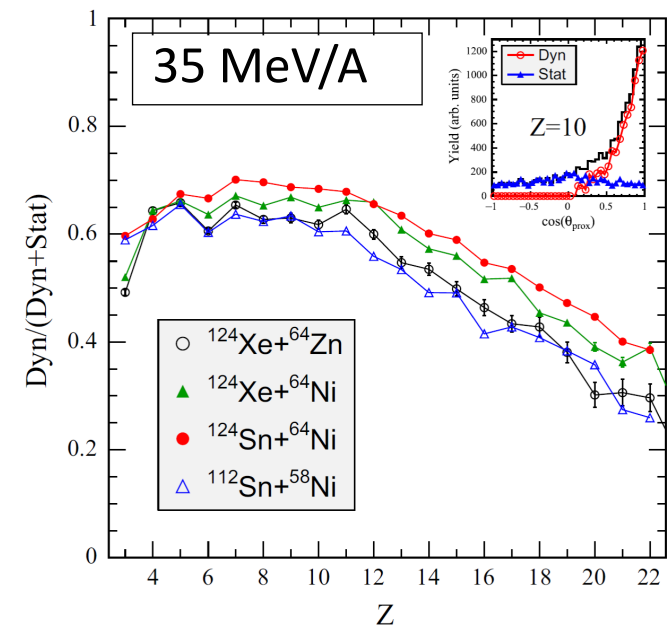
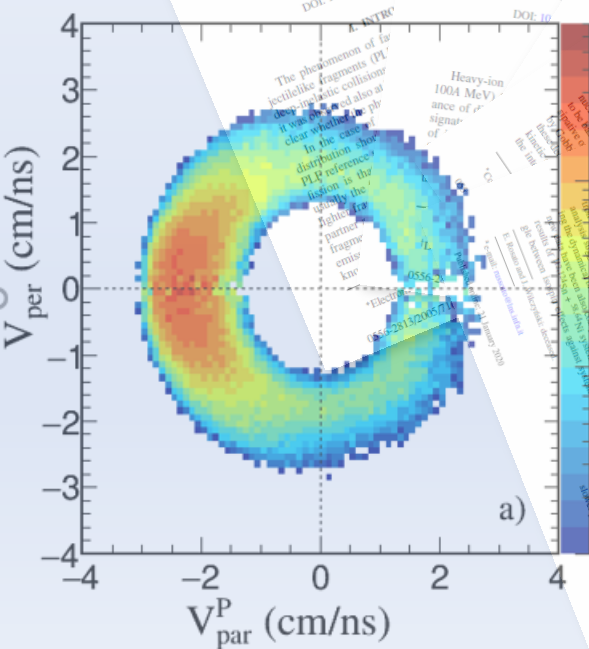
[DOI:10.5506/APhysPolBSupp.10.139](https://doi.org/10.5506/APhysPolBSupp.10.139)

I would like to invite you to read this paper written by Angelo for the Kazimiers workshop in 2016 honouring prof. J. Wilczyński. I think you will find in the paper many aspects (more than I can poorly describe in these slides) of Angelo personality as a scientist, as a man and as a friend.

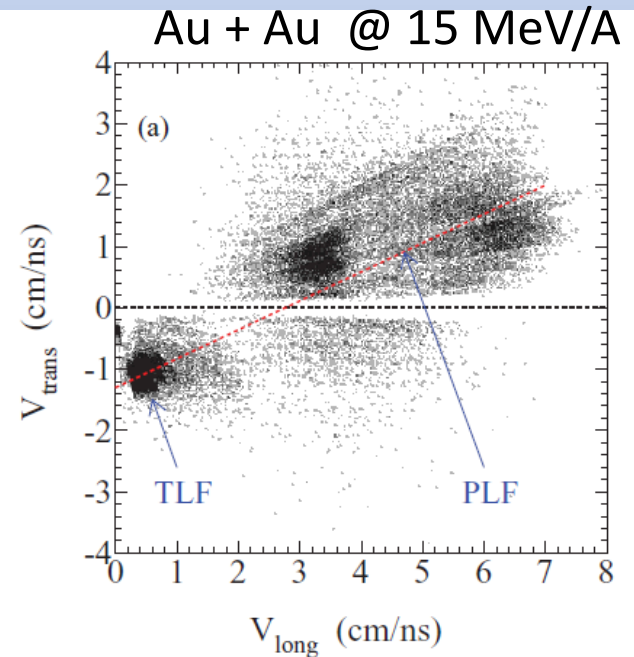
Janusz, Eryk Piasecki and Mihir Chatterjee



Dynamical (non-equilibrated) fission and . . . a long collaboration with Warsaw group



The InKilSy experiment



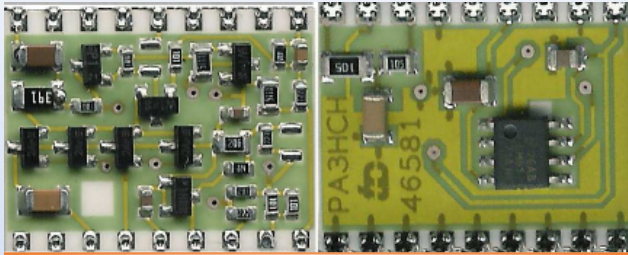
Spokes: Pagano and Wilczynski

Chimera third phase (EXOCHIM 2008-2015) : the Pulse-Shape upgrade

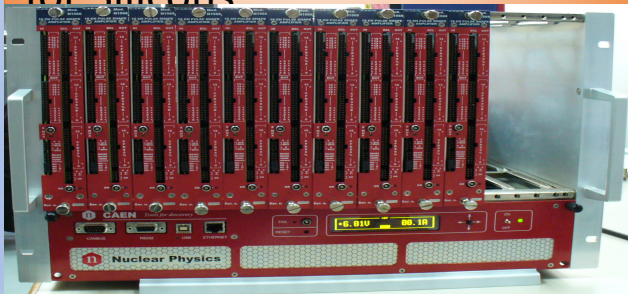
with R. Bassini (INFN-Mi) at GSI



17x23 mm²



The idea of pulse-shape upgrade was proposed by Angelo to advance in charged particle discrimination with PSD methods applied to Silicon detectors in direct mode injection. A new front-end electronic was developed for Silicons



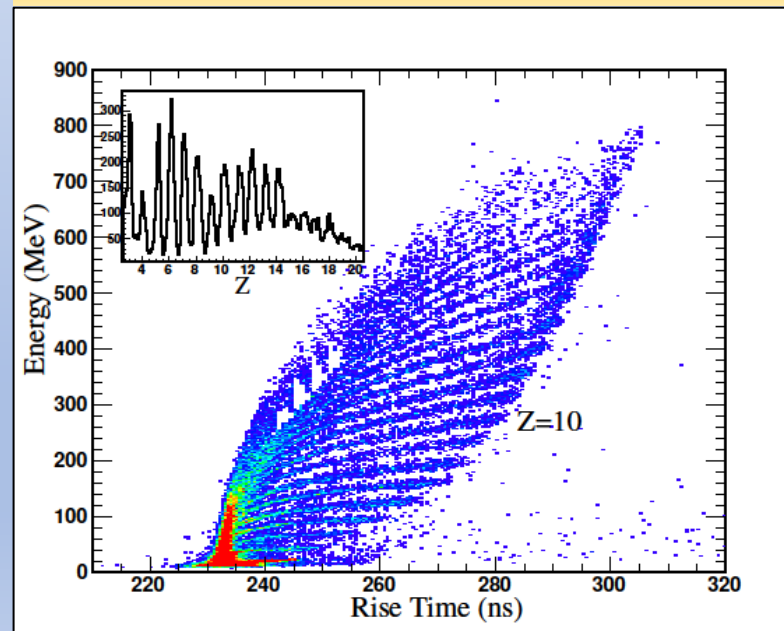
measuring the Rise-Time of the signals for particles stopping in the Si-detectors

IEEE TRANSACTIONS ON NUCLEAR SCIENCE, VOL. 51, NO. 5, OCTOBER 2004

Wide-Dynamic-Range Fast Preamplifier for Pulse Shape Analysis of Signals From High-Capacitance Detectors

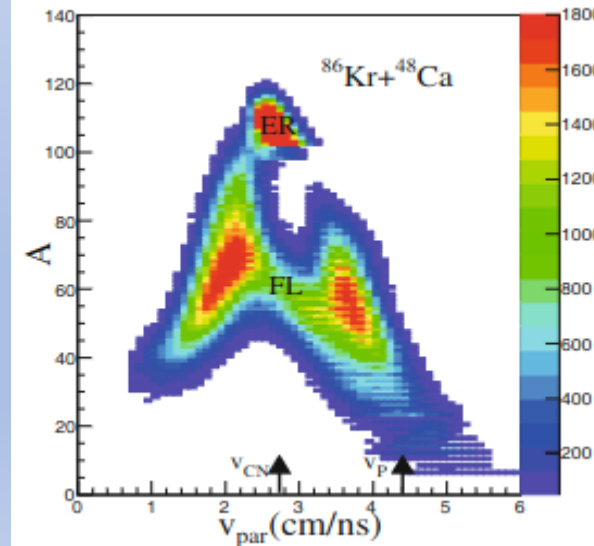
Ciro Boiano, Roberto Bassini, Alberto Pullia, and Angelo Pagano

Energy vs. rise-time $^{64}\text{Ni} + ^{124}\text{Sn}$ 35 A.MeV



E.d.F and A. Pagano EPJA 50, 32 (2014)

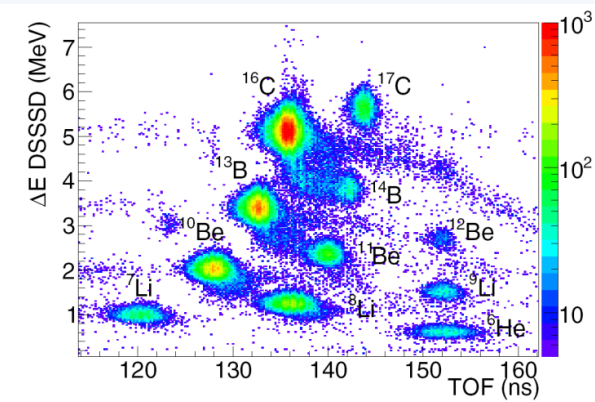
^{86}Kr beam at 10 MeV/A



S. Pirrone et al., EPJA 55, 22 (2019)

The ISODEC low energy experiment wouldn't be possible without the PS upgrade

HIB2015: An initiative for a workshop at ending of INFN-Catania direction (2007-2015)

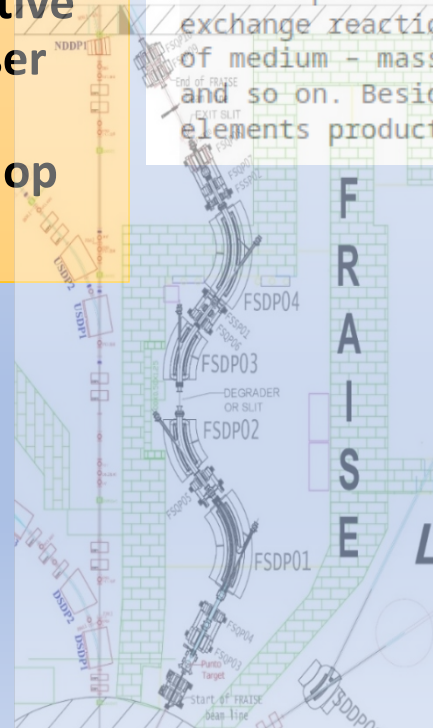


•Angelo was always highly involved to support LNS facilities and the upgrade project toward high intensity beams and the production of radioactive beams. In July 2015 he proposed to the LNS User Committee together with the LNS director G. Cuttone the organization of a two days workshop called HIB.

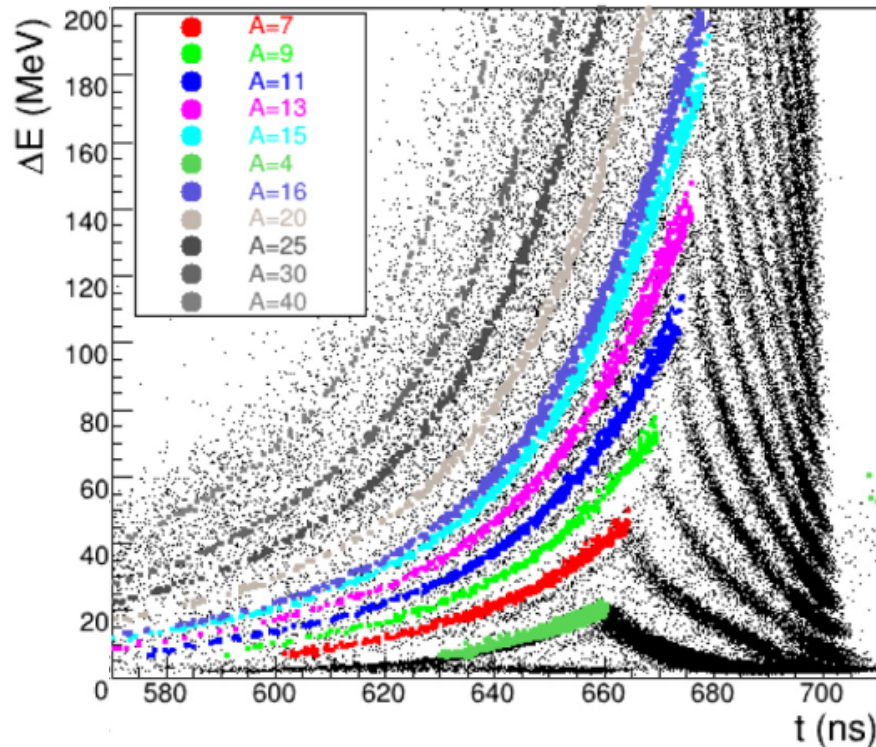
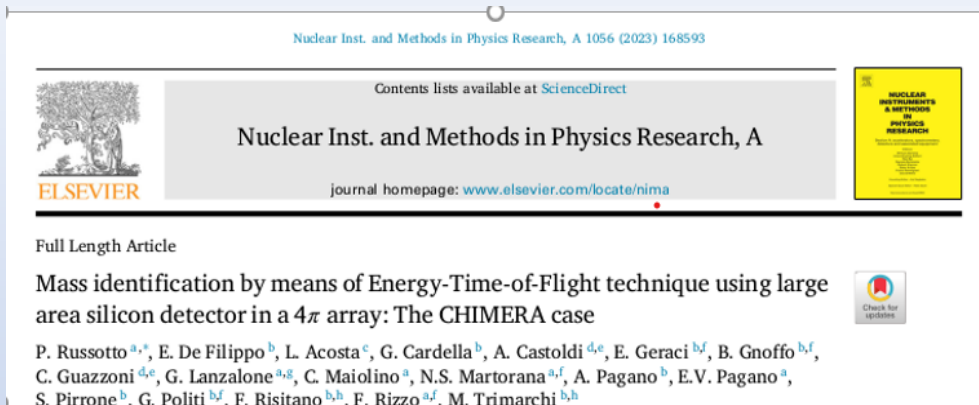
The recent proposal to upgrade the LNS Superconducting cyclotron by increasing the beam intensity of two orders of magnitude with respect to the existing facility represents an important progress in the field of Heavy Ion reactions at Fermi energy with both stable and exotic beams and related applications.

It is expected that different topics will benefit of this progress. Among these, it is important to mention the nuclear matrix element measurements in double exchange reactions and connection with neutrino physics, the in-flight production of medium - mass exotic beams by fragmentation reactions, clustering phenomena, and so on. Beside, possible overlaps with physics of heavy and super heavy elements productions are also expected.

Organized in few months, the workshop was a successful discussion among many local and international groups



Fast Timing : The FATA workshop



The **E-ToF** identification technique is fundamental for mass identification in CHIMERA detector, but good ns or sub-ns timing is a basic ingredient also for new detectors and PET medical applications

In 2019 Angelo was chair and promoter of the FATA workshop in Acireale putting together Fast timing studies in Nuclear physics and Medical applications for PET

IL NUOVO CIMENTO **43 C** (2020) 1
DOI 10.1393/ncc/i2020-20001-0

COLLOQUIA: FATA 2019

Preface

FRANCO GARIBALDI^{(1)(*)} and ANGELO PAGANO^{(2)(*)}

⁽¹⁾ INFN, Sezione di Roma - Roma, Italy

⁽²⁾ INFN, Sezione di Catania - Catania, Italy

received 2 March 2020

We are happy to present the FATA 2019 conference proceedings that include talks in heavy ion collisions and nuclear medical applications as well as, more generally, the foundations of the timing performances needed to achieve the best results in both fields. Attention is also devoted to the applications of this kind of researches in the future.

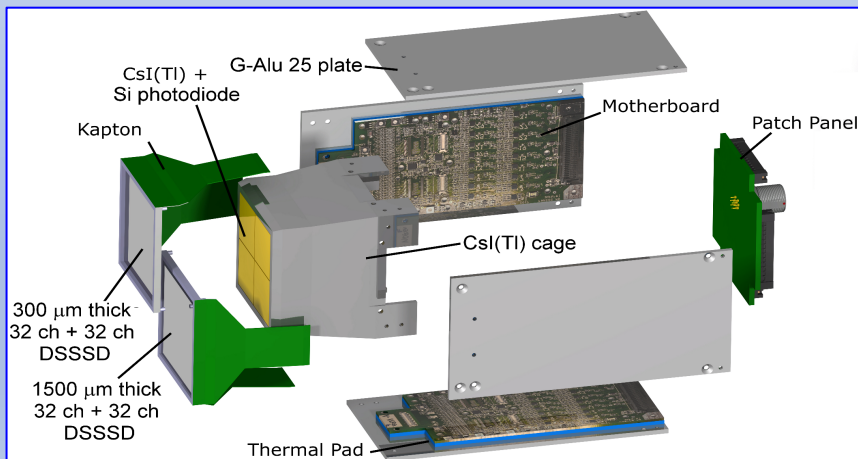
The realisation of a dedicated proceedings collection is the final achievement of the workshop held in Acireale on Fast Timing Applications and we hope it will contribute to enlarge the interest among scientists enthusiastically devoting their activities to the progress of fundamental and applied nuclear physics.



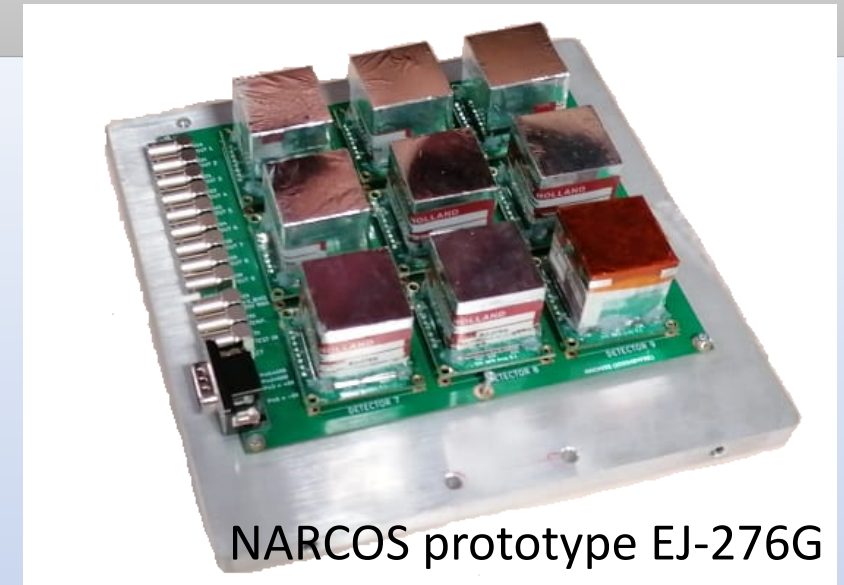
Two Chimera children : FARCOS and NARCOS

Angelo had always a great interest for neutron detection, in particular to add the neutron signal detection to capabilities of 4π arrays for the study of Heavy Ion Collisions under extreme conditions of isospin asymmetry produced by RIBs (radioactive beams) .

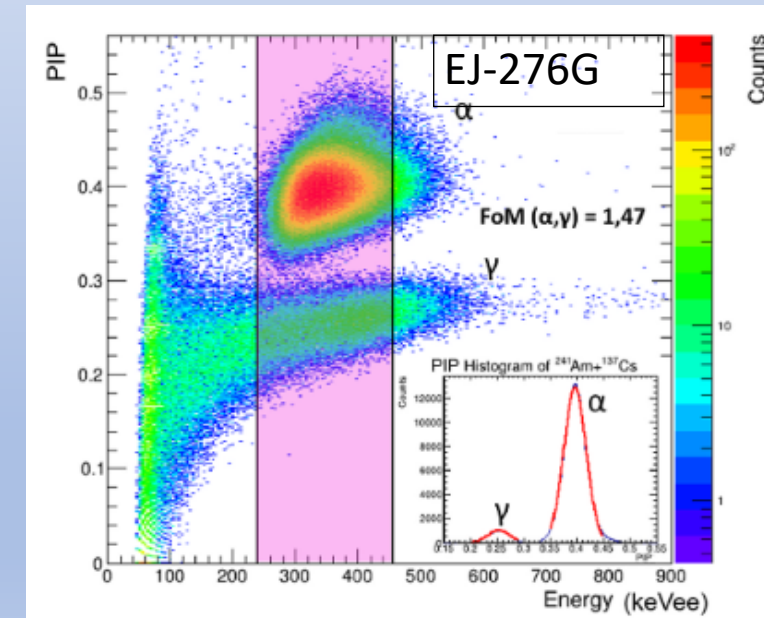
After a long study phase on EJ 299 and EJ 276 crystal family a project for the construction of a prototype of 64 plastic scintillator detector has started in 2022 under the 3 years funding of **PRIN2021 ANCHISE** project (about 600 k€ budget) whose Angelo was responsible up to 2023.



FARCOS telescope: Femtoscopy ARray for CHarged particles COrelations and Spectroscopy



NARCOS prototype EJ-276G



See. E.V. Pagano et al., Front. Phys. 10 (2023)
E.V. Pagano et al., NIM A1064, 169425 (2024)

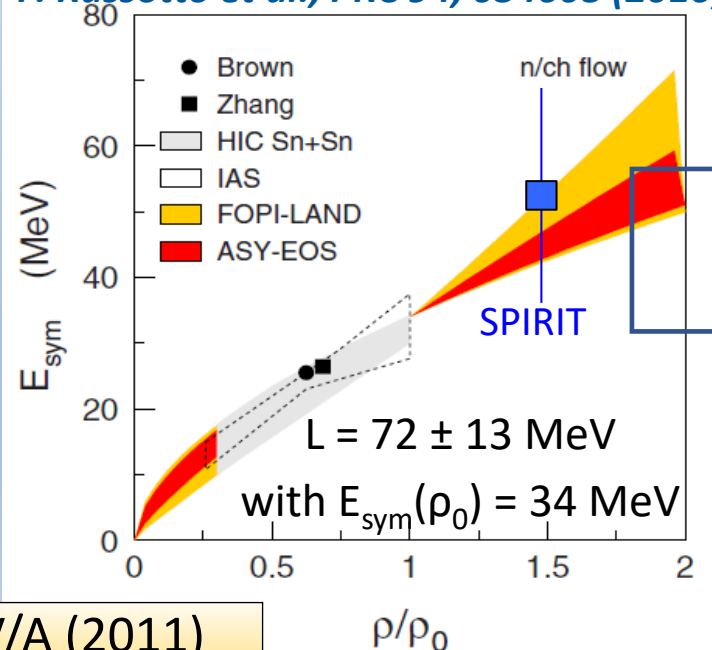
ASYEOS : Investigation of the symmetry energy at supra-saturation densities at GSI



AsyEos workshop 2017

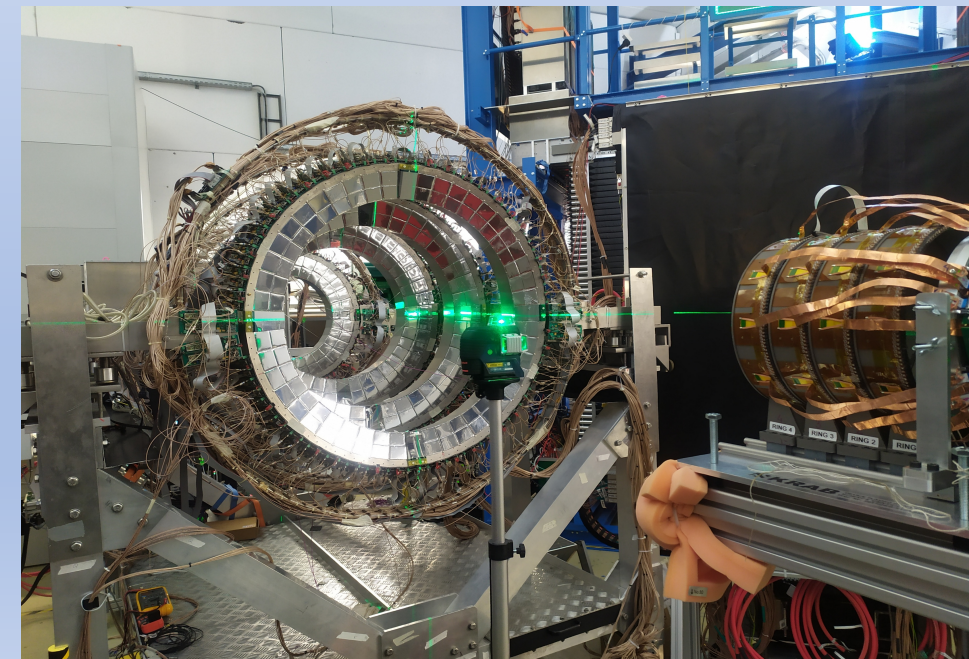
Probably, the first idea to move the CHIMERA rings to GSI started during a discussion at IWM2005 between Angelo and Wolfgang. After that a long history started, continuing up to now with the recent ASYEOS-II S122 experiment at GSI : - **Symmetry energy at high densities from neutron/proton flow excitation functions.**

P. Russotto et al., PRC 94, 034608 (2016)



Asyeos Au+Au 400 MeV/A (2011)

Asyeos-II experiment in R³B cave C (2025)
Au+Au at 280,400,600,1000 MeV/A



AsyEos workshop : making our research work known to people

Asy-Eos-2012 International Workshop
Nuclear Symmetry Energy and Reaction Mechanisms
Siracusa, Italy - September 4-6, 2012

International Scientific Committee

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A. CHBIHI (GANIL, Caen, France)
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M. COLONNA (INFN-LNS, Catania, Italy)
Y. LEIFELS (GSI, Darmstadt, Germany)
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A. PAGANO (INFN-Catania, Italy)
P. RUSOTTO (INFN-Catania, Italy)
H. SAKURAI (Riken, Japan)
W. TRAUTMANN (GSI, Darmstadt, Germany)
M.B. TSANG (NSCL-MSU, East Lansing, USA)
G. VERDE (INFN-Catania, Italy)
S. YENNELLO (Texas A&M, College Station, USA)

Local Organizing Committee

C. AGODI (INFN-LNS, Catania, Italy)
G. CARDELLA (INFN-Catania, Italy)
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G. LANZALONE (Univ. Kore, Enna & INFN-LNS, Catania, Italy)
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Istituto Nazionale di Fisica Nucleare
Università degli Studi di Catania

<http://www.ct.infn.it/asyeos2012> E-mail: asyeos@ct.infn.it

Asy-EoS 2015
International Workshop on
Nuclear Symmetry Energy and
Reaction Mechanisms
Piazza Armerina, Sicily, March 3-6 2015



International Scientific Committee

V. BARAN (Univ. of Bucharest, Romania)
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ASY-EOS-2012 INTERNATIONAL WORKSHOP
NUCLEAR SYMMETRY ENERGY AND REACTION MECHANISMS

Convegno di Studi
Eureka!
Creatività, genio e mistero in Archimede.
Alle radici della scienza moderna

Siracusa 6 Settembre 2012
Auditorium Museo Archeologico Regionale "Paolo Orsi"

PROGRAMMA
Ore 16,00/20,00

Accoglienza B. Basile - Direttore del Museo "Paolo Orsi"

Saluti delle Autorità A. Pagano, G. Tortorici

Apertura lavori P. D. Napolitani - Archimede, Alle radici della scienza moderna

Relazione generale Eureka! Creatività, Genio e mistero in Archimede

Incontro-Dibattito G. Boscarino, E. F. Castagnino, F. Giudice

Intervengono R. Migliorato, A. Pagano, D. Spadaro

Riflessioni conclusive G. Talbi, R. Valenti, A. Vittorio

R. Migliorato





Asyeos 2006: GSI Darmstadt
Asyeos 2008: Militello/Sez. Catania
Asyeos 2010: Noto
Asyeos 2012: Siracusa
Asyeos 2015: Piazza Armerina
Asyeos 2017: LNS and Caltagirone

But Angelo can not be understood without his studies on physics history, economy, environment, politics, philosophy...

Elementi di Economia: un'impostazione più vicina alla scienza fisica secondo le idee di Von Neumann, Sraffa e Notarrigo

Angelo Pagano

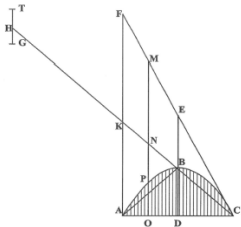
Abstract

Basic economic processes are examined in the context of Sraffa, Von Neumann and Notarrigo economic ideal models. It is shown that these models allow a reasonable description of the dynamical evolution of any realistic economic processes. Also, Some connections between economic processes and Entropy are discussed.

“It was a matter of recovering the ancient ideal of the italic scientist-philosophers, of a unitary and indivisible science where logic and philosophy proceeded together, being no separation between knowledge, physics, mathematics. We began a long process of reworking ancient italic thought, known by the names of Pythagoras, Parmenides, Democritus, Archimedes, etc., and then moving on to its rediscovery by Galileo, Newton, Boltzmann, and Peano”. [A Pagano and G. Boscarino in MondoTre (1999)]

MONDOTRE

Anno 1 - numero 1 - Dicembre 1999. Nuova serie



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QUADERNI DI STORIA DELLA FISICA
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N. 26 - 2022

Democrito: Una rivisitazione del modello meccanico Democritus: The mechanical model revisited

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Abstract. Democritus' mechanical model is revisited in this paper. The work aims at linking interdisciplinary researchers in the history, education and foundation of physics. The lack of Democritus' main works "*Great World-System*" and "*On the Nature of the World*" is compensated by using some selected translations of available fragments and testimonials. The two notions of *solid* and *necessity* are compared with *Laplacian determinism*. Democritus' cosmological model is understood in the framework of a stationary (infinite in extension) universe. Gravitation is also outlined and compared with Le Sage's collisional model of *pushing gravity*.



Chair@SISFA 2018



S. (Totò)Notarrigo

νέα ἐφ' ἡμέρη φρονέοντες

Thinking new things every day...
(sentence attributed to Democritus)



Hope he
is hearing
us...

Angelo's main physics contributions during his life and some triggered consequences:

➤ Projectile and target fragmentation, break-up and low energy fission

➤ The CHIMERA 4π project, Multi-fragmentation

➤ TimeScale

➤ New devices

➤ AsyEOS@GSI

➤ History of Physics and Epistemology

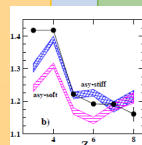
➤ First analysis of projectile fragmentation and test of a modified abrasion model at Fermi energies. Project of the ARGOS BaF_2 multidetector, LCP emission and correlations evaporation residues in hot nuclei, Fast electron production in collisions of swift heavy ions (G. Lanzaò)



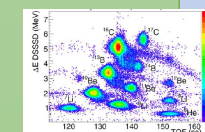
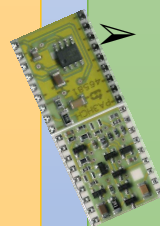
➤ Coalescence of a big international group having for many years a leader role in dynamical processes in fission and multifragmentation studies with experiments mainly done at INFN-LNS. Born of the biennial IWM Chimera-Indra conference (first one in 2001, last one IWM-EC in 2024)



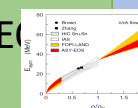
➤ Study of dynamical fission at Fermi energies. Experimental method for the measurement of emission time of light fragments by means of velocity correlation techniques. Method developed in collaboration with Prof. Janus Wilcynski. Symmetry energy at low densities. Triggering improvements in transport theories.



➤ Charge preamplifiers (CEA, INFN-Mi), amplifiers and discriminators for CHIMERA (Orsay, CEA, INFN-Mi, CAEN). Definition of the Pulse-Shape upgrade for CHIMERA. Studies on plastic scintillators. Neutron detection. FARCOS and NARCOS ancillary devices. Signal digitalizations. Fast timing. ANSIP2011 (Acireale) and FATA2019, FATA2025 workshops. Use of exotic beams and nuclear structure studies in CHIMERA



➤ Study of the EOS of nuclear matter at high density (GSI). ASYEOS experiment (2011). The ASYEOS workshops. The ASYEOS-II experiment (2025)



Newtonian and relativistic mechanics. Economy, physics and environmental problems. Studies and divulgation on Archimedes, Peano, Democritus, Mach. SISEA congress chair