CSN3: RELAZIONE SULLA RIUNIONE DI BILANCIO 2017

Rosario Turrisi

INFN
Istituto Nazionale
di Fisica Nucleare
Sezione di Padova

Arenzano (GE)

AGENDA DELLA RIUNIONE

Riunione del 18-22 settembre

from Monday, 18 September 2017 at **09:00** to Friday, 22 September 2017 at **14:00** (Europe/Rome)
at **Arenzano (Genova)**

Description Agenda definitiva
Material Informazioni logistiche

Go to da

Monday, 18 September 2017

09:00 - 12:00 Sessione chiusa
- 09:00 **Richieste straordinarie e sub-judice 2017** *2h0'*
- 11:00 **Prima analisi dei preventivi 2018** *1h0'*

12:00 - 13:50 Pausa pranzo

13:50 - 18:00 Sessione aperta
- 13:50 **Saluto del Direttore** *10'*
  Speaker: Giovanni Darbo (GE)
- 14:00 **AEGIS (30' + relazione referee)** *1h0'*
  Speaker: Dr. Gemma Testera (INFN Genova)
  Material: Slides
- 15:00 **LUNA3 (30' + relazione referee)** *1h0'*
  Speaker: Paolo Prati (GE)
  Material: Slides
- 16:00 Coffee break *30'*
- 16:30 **Comunicazioni del Presidente CSN3** *30'*
  Speaker: Mauro Gino Taiuti (GE)
- 17:00 **Comunicazioni del Membro di Giunta** *1h0'*
  Speaker: Eugenio Nappi (BA)

Tuesday, 19 September 2017

08:30 - 18:30 Sessione aperta
- 08:30 **ALICE** *1h0'*

  Stato degli upgrades per Run3 *30'*
  Speaker: Corrado Cicalo' (CA)
  Material: Slides

  Stato esperimento e richieste finanziarie *30'*
  Speaker: Vito Manzari (BA)
  Material: Slides
- 09:30 **Relazione referee ALICE** *1h0'*
  Speakers: Lucio Gialanella (NA), Sara Pirrone (CT)
  Material: Slides
- 10:30 Coffee break *30'*
- 11:00 **ASACUSA (30' + relazione referee)** *1h0'*
  Speaker: Luca Venturelli (PV)
  Material: Slides
- 12:00 **GAMMA (30' + relazione referee)** *1h0'*
  Speakers: Silvia Leoni (MI), Daniel Ricardo Napoli (LNL)
  Material: Slides
- 13:00 Pausa pranzo *1h30'*
- 14:30 **JLAB12 (60' + relazione referee)** *1h30'*
  Speakers: Guido Maria Urciuoli (ROMA1), Marco Battaglieri (GE)
  Material: Slides
- 16:00 Coffee break *30'*
- 16:30 **FOOT (30' + relazione referee)** *1h0'*
  Speaker: Vincenzo Patera (ROMA1)
  Material: Slides
- 17:30 **Il Calcolo al CNAF (30' + discussione)** *1h0'*
  Speaker: Daniele Cesini (CNAF)
  Material: Slides

Wednesday, 20 September 2017

09:00 - 19:00 Sessione chiusa
- 09:00 **Discussione sulle richieste e preparazione bilancio 2018** *4h0'*
- 13:00 Pausa pranzo *1h30'*
- 14:30 **Discussione sulle richieste e preparazione bilancio 2018** *4h30'*

Thursday, 21 September 2017

09:00 - 19:00 Sessione chiusa
- 09:00 **Discussione sulle richieste e preparazione bilancio 2018** *4h0'*
- 13:00 Pausa pranzo *1h30'*
- 14:30 **Discussione sulle richieste e preparazione bilancio 2018** *4h30'*

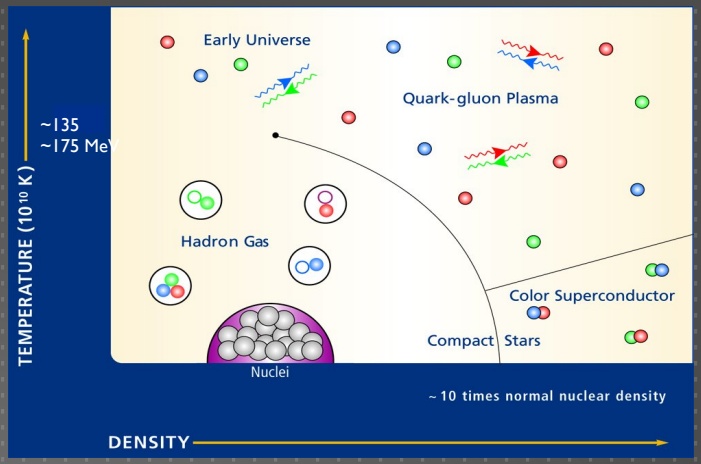
Friday, 22 September 2017

09:00 - 14:00 Sessione chiusa
- 09:00 **Discussione sulle richieste e preparazione bilancio 2018** *4h0'*
- 14:00 Fine riunione

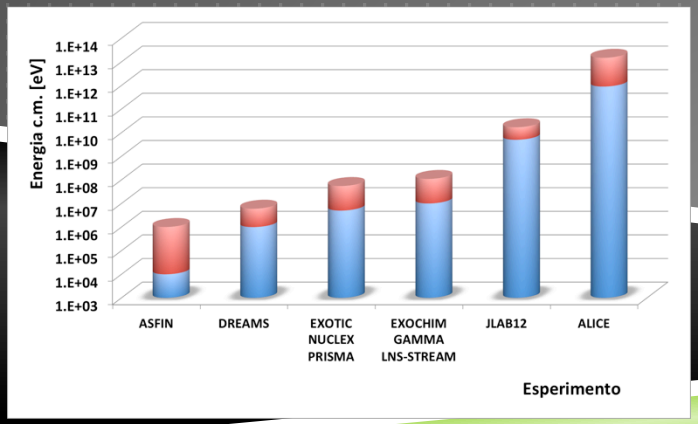
ESPERIMENTI IN CSN3

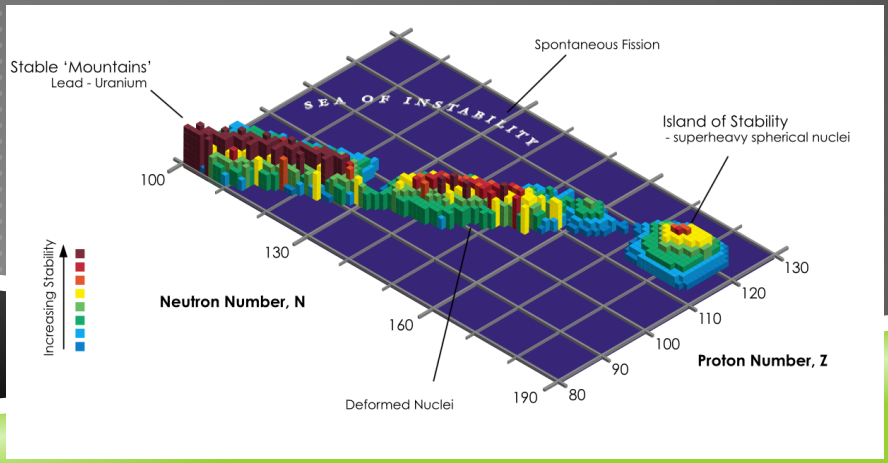
Qualche statistica del 2016 (2015/14/13):

- ✓ 480 (479 / 462 / 460) FTE
- ✓ 460 (426 / 456 / 323) pubblicazioni ISI
- ✓ 471 (488 / 512 / 560) talk
- ✓ 22 (16 / 26 / 29) tesi dottorato
- ✓ 47 (29 / 32 / 22) laurea (T/S)



Accessibilità dati consuntivi limitata





ESPERIMENTI IN CSN3: 24 SIGLE

1 Quarks and hadron dynamics

2 Phase transitions of nuclear and hadronic matter

3 Nuclear structure and on dynamics

4 Nuclear astrophysics and interdisciplinary researches

Linea 1

SONDE ELETTROMAGNETICHE

JLAB12 Struttura nucleone e^-/γ +p,nuclei

MAMBO Fotoproduzione di mesoni per risonanze barioniche $\gamma + p_{pol}$

SONDE ADRONICHE

ASACUSA Spettroscopia anti-H pbar+nuclei

JEDI (ex PAX) misura di edm p,d $pbar_{pol}+p$

KAONNIS Atomi e nuclei kaonici

PANDA (sigla chiusa) Struttura adroni, ipernuclei

ULYSSES Spettroscopia ipernuclei k+nuclei

Linea 2

Linea 3

nismi di reazione, dipendenza da isospin

ring, dinamica delle reazioni, fusione/fissione

azioni) Studi di fusione/fissione

er la

Struttura nucleare, fusione sotto barriera, stati debolmente legati, risonanze, quasi-elastico

a nucleare, temperatura, momento angolare

raggio di Zemach del protone

del ^{229}Th

rici nucleari in reazioni di doppio scambio di carica

VARIE

- M. Taiuti: stimolare partecipazione ai bandi CSN5 "senior"!
- Allineamento alle linee guida delle percentuali partecipanti e responsabili nazionali
- E. Nappi
  - IGNITOR non sarà più gestito da INFN ma da CNR (budget 14 M€)
  - Borse COFUND Fellini
  - IUPAP: proposto Masiero membro INFN
    - conferenza INPC
  - EIC: interessante per la CSN3, proposta di Ferroni di riunire in un'unica commissione le compagini interessate
- Istituito gruppo di lavoro per definire una modalità di supporto giovani
  - possibilità di stage, summer student, supporto tesi per studenti triennali o magistrali

LUNA e LUNA-MV: stato e attività nel prossimo futuro

Paolo Prati

Dipartimento di Fisica e Sezione INFN - Genova

RN e Spokesperson della Collaborazione LUNA

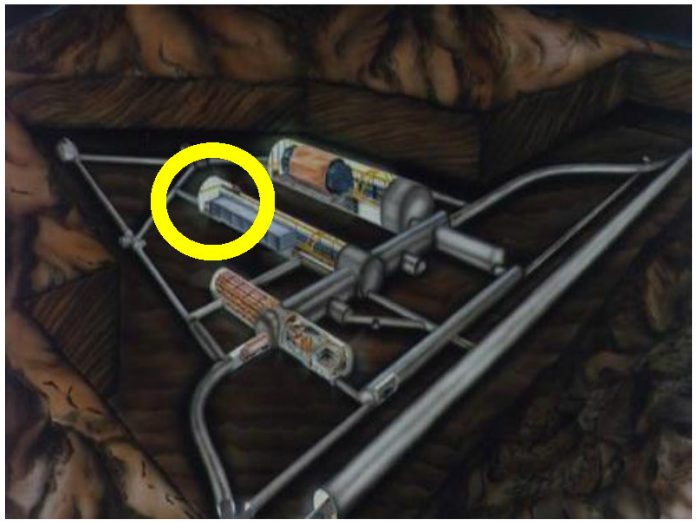
Riunione CSN3, Arenzano 18/9/17

LUNA: scientific output
(last 12 months)

Article	April 2017
M. Lugaro et al., *Origin of stardust unveiled by the new LUNA rate of the $^{17}O(p,\alpha)^{14}N$ reaction*	Nature Astronomy 1(2017)0027
O. Straniero et al., *The impact of the revised $^{17}O(p,\alpha)^{14}N$ reaction rate on the ^{17}O stellar abundances and yields*	Astronomy & Astrophysics 598(2017)A128
R. Depalo et al., *Direct measurement of low-energy $^{22}Ne(p,g)^{23}Na$ resonances*	Physical Review C 94 (2016)055804
A. Slemer et al., *^{22}Ne and ^{23}Na ejecta from intermediate-mass stars: The impact of the new LUNA rate for $^{22}Ne(p;\gamma)^{23}Na$*	Monthly Notes of the Royal Astronomical Society 465(2017)4817
D. Trezzi et al., Big Bang Lithium-6 nucleosynthesis studied deep underground.	Astroparticle Physics 89(2017)57

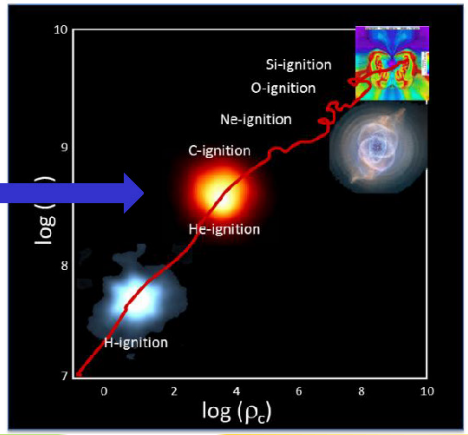
LUNA-MV

LUNA MV will be installed in the North part of Hall B of LNGS



Hall B

(ICARUS decommissioning almost complete – some areas used for OPERA decommissioning storage)



See LUNA-MV proposal

LUNA-MV
problems occurred in June-July 2017

1) A causa di una rilevata irregolarità formale *(ritardato versamento di 37 € ad ANAC)* nella documentazione di gara per la schermatura *(importo ~ 650 k€),* è stato presentato ricorso dalla Ditta classificata seconda….la Ditta aggiudicataria ha presentato a sua volta ricorso….la pratica è nelle mani del TAR che, auspicabilmente, si pronuncerà il 10 ottobre 2017.

2) E' stato riscontrato un malfunzionamento del carro ponte di sala B ed è in corso un accertamento per valutare gli interventi necessari. A seconda dell'esito della perizia (*attesa per fine settembre 2017*) si potrà procedere per affidamento diretto ovvero tramite gara di appalto (*con tempi di ripristino non valutabili*)

LUNA-MV : present schedule

Action	Date
Approval of the first HVEE technical design	October 2016
Opening of the tendering procedure for LUNA-MV plants	November 2016
Submission of the Authorization request to «Prefettura dell'Aquila»	December 2016
Beginning of the clearing works in Hall B	February 2017
End of the tendering procedure for the new LUNA-MV building	OCTOBER 2017
Beginning of the construction works in Hall B	JANUARY 2018
End of the tendering procedure for LUNA-MV plants	APRIL 2018
Beginning of the construction of the plants in the LUNA-MV building	JULY 2018
In-house acceptance test for the new LUNA-MV accelerator	February 2018
Completion of the new LUNA-MV building and plants	NOVEMBER 2018
LUNA-MV accelerator delivering at LNGS	**DECEMBER 2018**
Conclusion of the commissioning phase	MAY 2019
Beginning First Experiment	JUNE 2019

Conclusive notes on the financial request

Disponibile dal fondo premiale LUNA-MV: ~ 450 k€

Item (LUNA-MV)	Costo	Copertura	Note
Sala controllo	90 k€	progetto premiale	Consolidato, aggiudicazione provvisoria effettuata oggi.
Impianti	360 k€	progetto premiale	Stima senza ribassi provenienti dalla gara
Sistema recupero e stoccaggio SF6	*200 k€*	*CSN3*	*Richieste finanziarie 2018*
Monitor n e γ	*85 k€*	*CSN3*	*Richieste finanziarie 2018*
totale	735 k€		Costo non coperto pari a circa il **5%** del totale

INFN
Commissione Scientifica Nazionale III
Sep 19 2017

BDX
Dark Matter search in a Beam Dump eXperiment

M.Battaglieri, A.Celentano*, M.DeNapoli*, R.DeVita*, E.Izaguirre, G.Krnjaic, E.Smith*

and the BDX Collaboration

**= INFN*

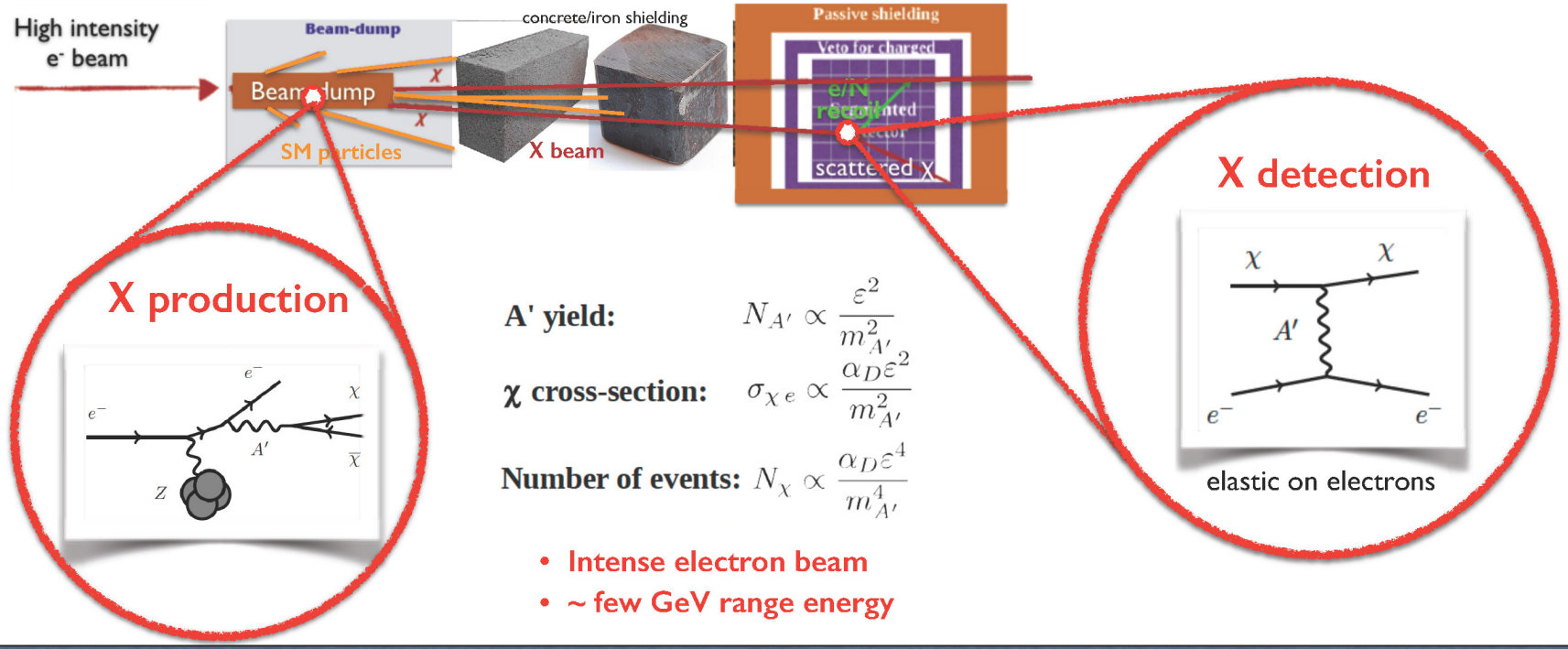
The BDX experiment

Two step process

I) An electron radiates an A' and the A' promptly decays to a χ (DM) pair

II) The χ (in-)elastically scatters on a e^-/nucleon in the detector producing a visible recoil (GeV)

PhysRevD.88.114015 E.Izaguirre,G.Krnjaic, P.Schuster, N.Toro



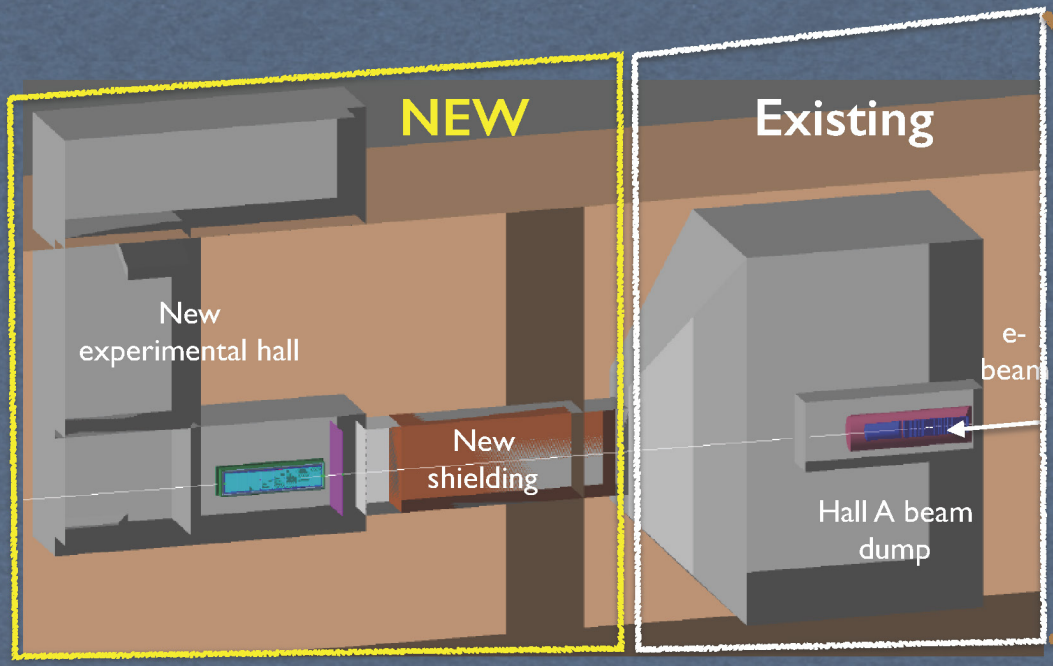
Experimental signature in the detector:

X-electron → EM shower ~GeV energy

BDX at JLab

- ★ High energy beam available: 11 GeV
- ★ The highest available electron beam current: ~65 uA
- ★ The highest integrated charge: 10^{22} EOT (41 weeks)

- ★ BDX detector located downstream of Hall-A beam dump
- ★ New underground experimental hall

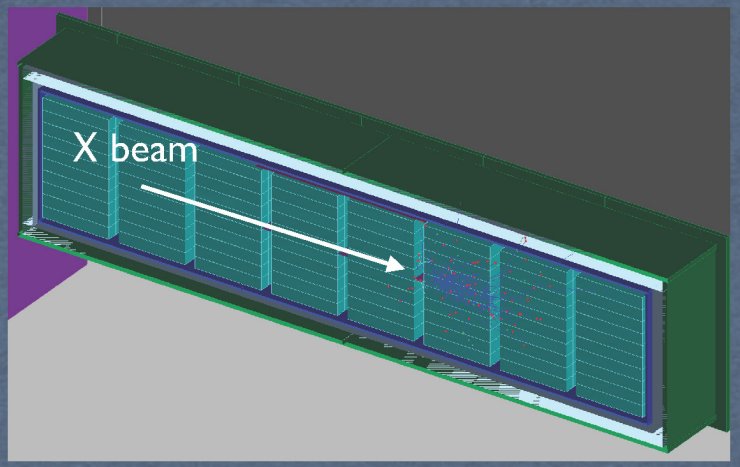


The BDX detector

Detecting the X

E.M. Calorimeter

A **homogeneous crystal**-based detector combines all necessary requirements

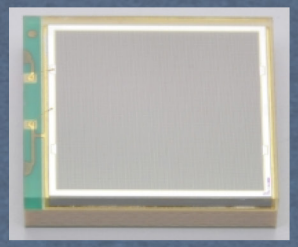


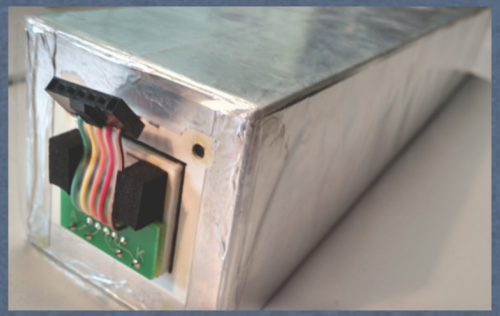
Rejecting the bg

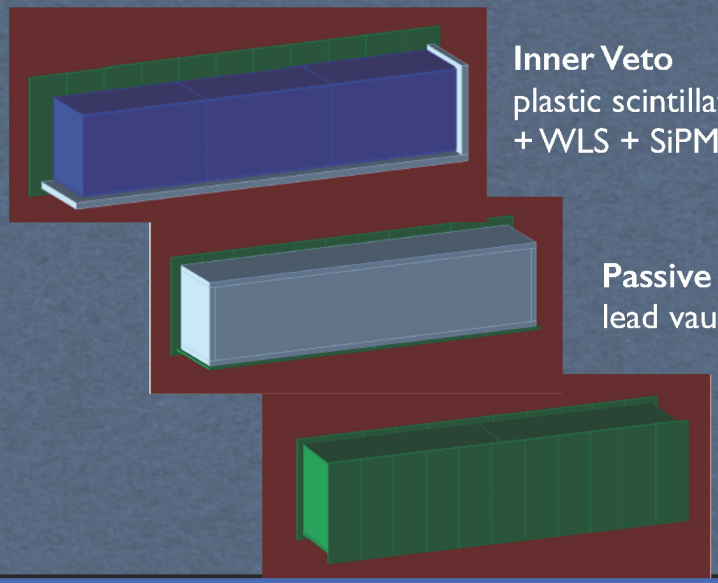
• Cosmic • Beam-on

Active veto

Two layers: of **plastic scintillator**
OV: light guide + PMT
IV: WLS + SIPM







Inner Veto
plastic scintillator
+ WLS + SiPM

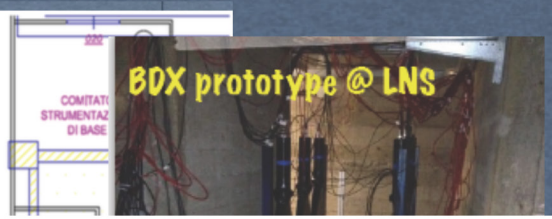
Passive shielding
lead vault 5cm thick

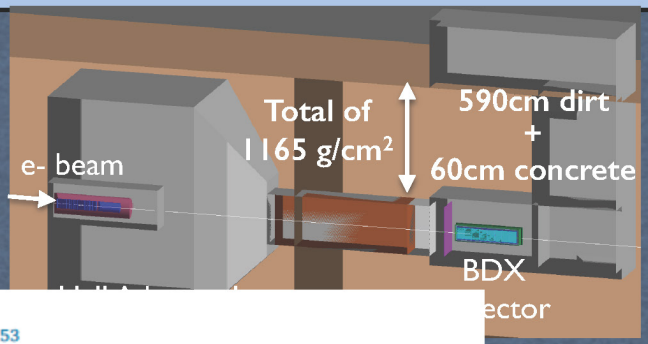
Outer Veto
plastic scintillator
+ PMTs

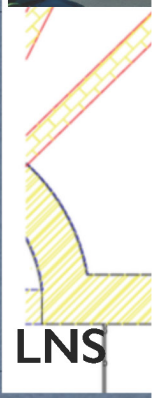
Modular EM calorimeter

- 8 modules 10x10 crystals each
- 800 CsI(Tl) crystals (from BaBar EMCal)
- 6x6 mm^2 Hamamatsu SiPM readout
- 50 x 55 x 295 cm^3

Detector prototyping: cosmic BG assessment





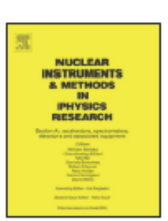


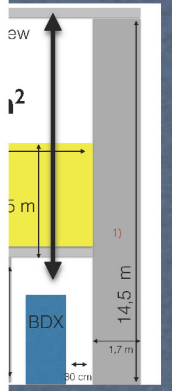
Nuclear Inst. and Methods in Physics Research, A 867 (2017) 148–153

Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

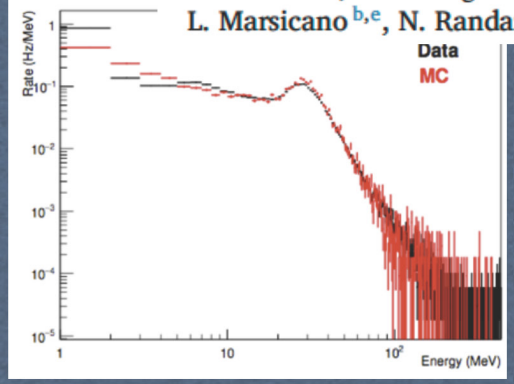
journal homepage: www.elsevier.com/locate/nima

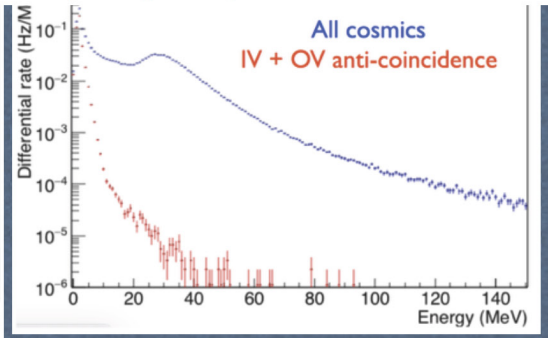


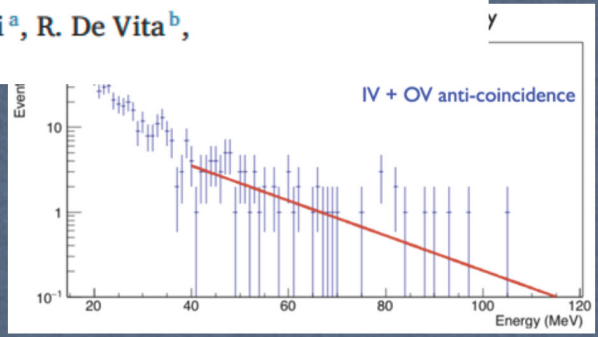


Large-size CsI(Tl) crystal read-out by SiPM for low-energy charged-particles detection

M. Bondí [a,*], M. Battaglieri [b], M. Carpinelli [c,d], A. Celentano [b], M. De Napoli [a], R. De Vita [b], L. Marsicano [b,e], N. Randazzo [a], V. Sipala [c,d], E.S. Smith [f]







Extrapolation to E>300MeV deposited shows NO counts in BDX life-time

BDX proposal submission to JLab Program Advisory Committee

LOI presented to JLab PAC42 (2014)
- prepare a full proposal

Summary and Recommendation: BDX could become the definitive beam dump experiment at electron accelerators. Sited at Jefferson Lab, it would use the CEBAF high intensity beam and modern technologies for detector design, trigger, and data acquisition, to achieve the most stringent limits (or to make the first discovery) of a class of dark matter particles.

The collaboration is encouraged to proceed with a full proposal to the laboratory, but the PAC emphasizes that the collaboration needs to meet a high standard in order to be eventually approved. Experimentally, a fully fleshed-out detector design needs to be presented, including both simulations and measurements (with CORMORINO or otherwise) that demonstrate its sensitivity to both detection channels as well as its ability to reject cosmic ray backgrounds with whatever necessary overburden. Theoretically, it must be made clear what models and attendant assumptions motivate this particular measurement, as well as the extent to which these models are (or are not) addressed in other experiments at other laboratories. Finally, the PAC realizes that the infrastructure costs to build and instrument a pit that would house this experiment will be extensive, and recommends that the laboratory require an approved proposal before scheduling onsite tests with beam as part of the design process.

BDX Proposal to JLAB PAC 44 (2016)
- Conditionally Approved (C2)
- beam-on bg
- full simulation (~10^{22} EOT)

While simulations are an essential tool in understanding background conditions, they are not sufficient to design an experiment. The BDX collaboration is therefore encouraged to think more about benchmarking their simulations with measurements on site.

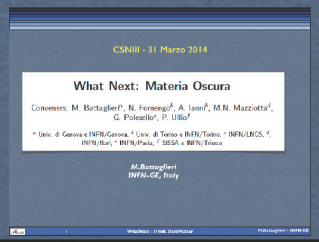
BDX Proposal update to JLAB PAC 45 (2017)
- in situ beam-on bg tests
- simulation strategy

Summary: The collaboration should continue working with JLab to carry out the proposed tests, towards achieving full approval at a subsequent PAC.

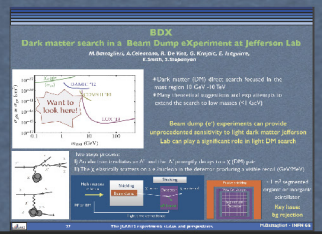
Tests/simulations results to JLAB PAC 46 (2018) Full approval with scientific rating (C1)

BDX presentation to INFN-CSN3

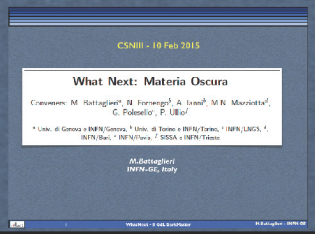
CSN3 Mar14 Roma



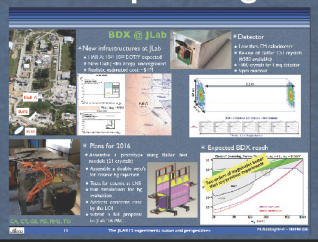
CSN3 Sep14 Bari



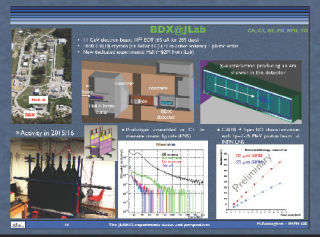
CSN3 Feb15 Roma



CSN3 Sep15 Cagliari



CSN3 Sep216 Perugia



Seeking funds

- ★ Growing word-wide (CERN, Mainz, LNF) and US (JLab, Fermilab SLAC, Cornell) interest for LDM searches
- ★ DOE-organized workshop in March 2017 at University of Maryland to identify new small projects for DM searches to complement the already approved program

U.S. Cosmic Visions: New Ideas in Dark Matter

23-25 March 2017 *Stamp Student Union, University of Maryland, College Park*
US/Eastern timezone

"To respond to the 2014 P5 report recommendations in the search for dark matter particles and maintaining a diversity of project scales in our program, **DOE Office of High Energy Physics (HEP) is interested in identifying new, small projects for dark matter searches in areas of parameter space (i.e. mass ranges or types of particles) not currently being (or on track to be) explored.** HEP is asking for community input in the spring 2017 timeframe in order to plan the program forward. Input is requested on the possibilities for small (the whole project is ~ $10 million or less) dark matter projects in unexplored parameter space. A community workshop, followed by a White Paper would be a good path to provide the input needed. We encourage you to collect information from the community, including theorists and experimentalists involved in non-accelerator and accelerator-based efforts."

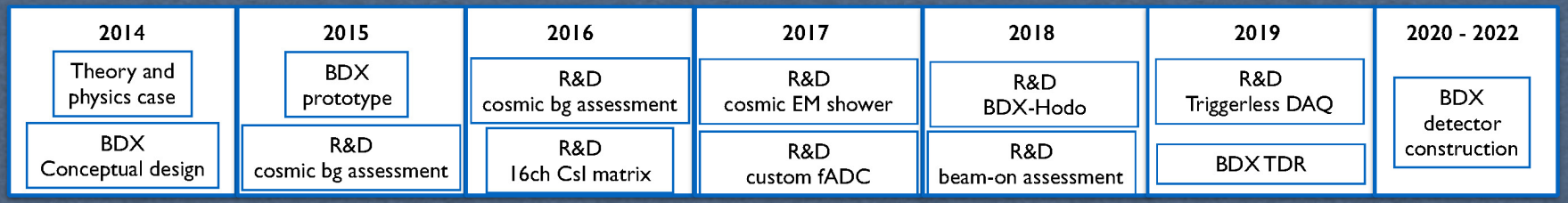
US Cosmic Visions: New Ideas in Dark Matter 2017 : Community Report

Marco Battaglieri (SAC co-chair),[1] Alberto Belloni (Coordinator),[2] Aaron Chou (WG2 Convener),[3] Priscilla Cushman (Coordinator),[4] Bertrand Echenard (WG3 Convener),[5] Rouven Essig (WG1 Convener),[6] Juan Estrada (WG1 Convener),[3] Jonathan L. Feng (WG4 Convener),[7] Brenna Flaugher (Coordinator),[2] Patrick J. Fox (WG4 Convener),[3] Peter Graham (WG2 Convener),[8] Carter Hall (Coordinator),[2] Roni Harnik (SAC member),[3] JoAnne Hewett (Coordinator),[8,9] Joseph Incandela (Coordinator),[10] Eder Izaguirre (WG3 Convener),[11] Daniel McKinsey (WG1 Convener),[12] Matthew Pyle (SAC member),[12] Natalie Roe (Coordinator),[13] Gray Rybka (SAC member),[14] Pierre Sikivie (SAC member),[15] Tim M.P. Tait (SAC member),[7] Natalia Toro (SAC co-chair),[9,16] Richard Van De Water (SAC member),[17] Neal Weiner (SAC member),[18] Kathryn Zurek (SAC member),[13,12] Eric Adelberger,[14] Andrei Afanasev,[19] Derbin Alexander,[20] James Alexander,[21] Vasile Cristian Antochi,[22] David Mark Asner,[23] Howard Baer,[24] Dipanwita Banerjee,[25] Elisabetta Baracchini,[26] Phillip Barbeau,[27] Joshua Barrow,[28] Noemie Bastidon,[29] James Battat,[30] Stephen Benson,[31] Asher Berlin,[9] Mark Bird,[32] Nikita Blinov,[8] Kimberly K. Boddy,[33] Mariangela Bondì,[34] Walter M. Bonivento,[35] Mark Boulay,[36] James Boyce,[37,31] Maxime Brodeur,[38] Leah Broussard,[39] Ranny Budnik,[40] Philip Bunting,[12] Marc Caffee,[41] Sabato Stefano Caiazza,[42] Sheldon Campbell,[7] Tongtong Cao,[43] Gianpaolo Carosi,[44] Massimo Carpinelli,[45,46] Gianluca Cavoto,[22] Andrea Celentano,[1] Jae Hyeok Chang,[6] Swapan Chattopadhyay,[3,47] Alvaro Chavarria,[48] Chien-Yi Chen,[49,16] Kenneth Clark,[50] John Clarke,[12] Owen Colegrove,[13] Jonathon Coleman,[51] David Cooke,[25] Robert Cooper,[52] Michael Crisler,[23,3] Paolo Crivelli,[25] Francesco D'Eramo,[53,54] Domenico D'Urso,[45,46] Eric Dahl,[50] William Dawson,[44] Marzio De Napoli,[34] Raffaella De Vita,[1] Patrick DeNiverville,[55] Stephen Derezno,[15] Antonia Di Crescenzo,[56,57] Emanuele Di Marco,[58] Keith R. Dienes,[59,2] Milind Diwan,[11] Dongwi Handiipondola Dongwi,[43] Alex Drlica-Wagner,[3] Sebastian Ellis,[60] Anthony Chigbo Ezeribe,[61,62] Glennys Farrar,[18] Francesc Ferrer,[63] Enectali Figueroa-Feliciano,[64] Alessandra Filippi,[65] Giuliana Fiorillo,[66] Bartosz Fornal,[67] Arne Freyberger,[31] Claudia Frugiuele,[60] Cristian Galbiati,[68] Iftah Galon,[7] Susan Gardner,[69] Andrew Geraci,[70] Gilles Gerbier,[71] Mathew Graham,[9] Edda Gschwendtner,[72] Christopher Hearty,[73,74] Jaret Heise,[75] Reyco Henning,[76] Richard J. Hill,[16,3] David Hitlin,[5] Yonit Hochberg,[21,77] Jason Hogan,[8] Maurik Holtrop,[78] Ziqing Hong,[79] Todd Hossbach,[23] T. B. Humensky,[79] Philip Ilten,[80] Kent Irwin,[8,9] John Jaros,[9] Robert Johnson,[81] Matthew Jones,[41] Yonatan Kahn,[68] Narbe Kalantarians,[61] Manoj Kaplinghat,[7] Rakshya Khatiwada,[14] Simon Knapen,[13,12] Michael Kohl,[43,31] Chris Kouvaris,[82] Jonathan Kozaczuk,[83] Gordan Krnjaic,[3] Valery Kubarovsky,[31] Eric Kuflik,[21,77] Alexander Kusenko,[84,85] Rafael Lang,[41] Kyle Leach,[86] Tongyan Lin,[12,13] Mariangela Lisanti,[68] Jing Liu,[87] Kun Liu,[17] Ming Liu,[17] Dinesh Loomba,[88] Joseph Lykken,[3] Katherine Mack,[89] Jeremiah Mans,[4] Humphrey Maris,[90] Thomas Markiewicz,[9] Luca Marsicano,[1] C. J. Martoff,[91] Giovanni Mazzitelli,[58] Christopher McCabe,[92] Samuel D. McDermott,[8] Art McDonald,[93] Bryan McKinsey,[68] Dongming Mei,[87] Tom Melia,[13,68] Gerald A. Miller,[44] Kentaro Miuchi,[94] Sahara Mohammed,[95] Prem Nazeer,[43] Omar Moreno,[9] Vasiliy Morozov,[31] Frederic Mouton,[61] Holger Mueller,[12] Alexander Murphy,[96] Russell Neilson,[96] Tim

White paper submitted to DOE

- ★ The *white-paper* (signed by more than 200 researchers) will be used to evaluate the opportunity of DOE/NSF funding call for small (scale <$10M) project in the area to be launched soon (2018/19?)
- ★ **BDX has been included as a project in LDM searches with accelerators program**

A roadmap towards BDX	Completion
Theory and physics case	100%
Detector R&D: signal detection and BG rejection	100%
Detector prototyping: cosmic BG assessment	100%
Detector prototyping: beam-related BG assessment	spring 2018 (12 GeV available in Hall-A)
BDX proposal submission to JLab Program Advisory Comm	C2-Approved; full approval summer 2018
Costs estimate	baseline fully defined
Funds procurement	full PAC approval required
The BDX Collaboration	Lobbying started
Costs optimization	custom electronics ready for 2018
TDR	2018-2019
Infrastructure and detector construction	2020-2022 (?)
Running BDX	2022-2025 in parallel Moeller exp



GAMMA: Struttura nucleare con spettroscopia γ

NUCLEI ESOTICI LONTANO DALLA VALLE DI STABILITA'
LIMITI dell'ESISTENZA del SISTEMA NUCLEARE

Rinnovo della Sigla 2018 - 2022

GAMMA

FTE: 46
Persone: 58
5 Sezioni: FI,LNL,MI,PD,PG

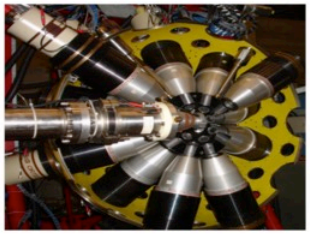
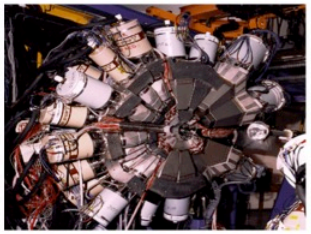
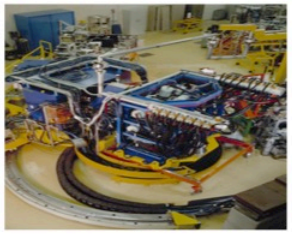
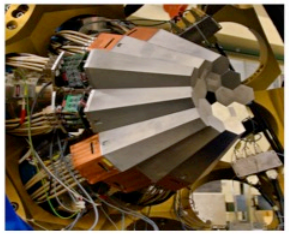
CONSUNTIVI 2016
96 pubblicazioni
88 Talks
18 Tesi

Spettroscopia GAMMA allo stato dell'arte

Spettroscopia γ di alta risoluzione e alta efficienza

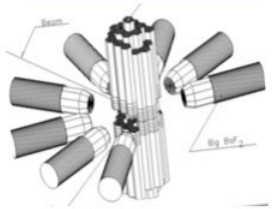
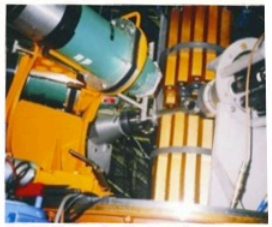
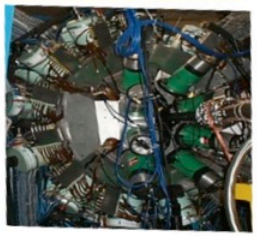
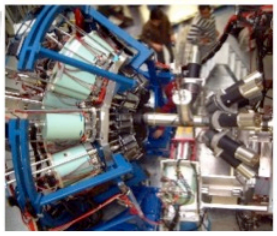
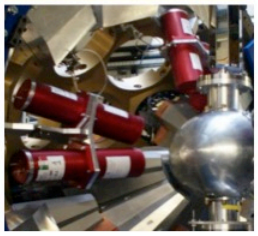
Rivelatori HPGe per raggi gamma ai LNL

MIPAD 1988 - 1992

GASP 1992 - 2012	EUROBALL 1997 - 1998	CLARA 2004 - 2008	AGATA 2009 - 2011	GALILEO 2014 - …	AGATA 2022- …
					AGATA ADVANCED GAMMA TRACKING ARRAY

Spettroscopia γ di alta energia – RESPONSABILITA' di MILANO

Rivelatori scintillatori per raggi gamma (BaF_2, $LaBr_3$, …)

HECTOR 1980' @ NBI	HECTOR 1990' @ LNL	HECTOR 2000' @ IRES	HECTOR 2000' @ GSI	HECTOR+ 2010' @ GSI	HECTOR+ 2014' @ RIKEN	LaBr3 Galileo 2016' @ LNL
						

Ricerca e Sviluppo

Rivelatori HPGe, scintillatori e nuovi materiali, elettronica dedicata …

CAMPAGNE GAMMA 2016-2017- …

- Laboratori di Legnaro – GALILEO …
- GANIL - AGATA
- OSAKA / RIKEN
- ISOLDE
- ILL (Grenoble)
- Bucharest
- GSI – fasci radioattivi FAIR 0 (SIS18) dal 2018
- Jyväskylä
- ORSAY
- CRACOVIA
- MSU – fasci radioattivi
- ARGONNE – Gretina nel 2018

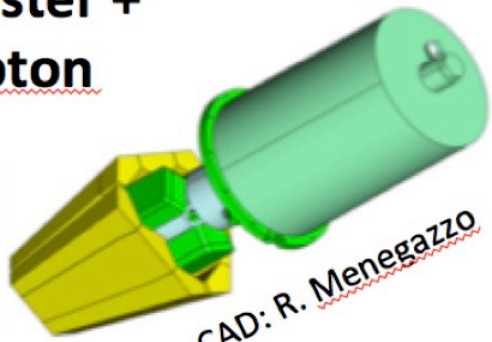
"Selected HIGHLIGHTS"

GALILEO phase I

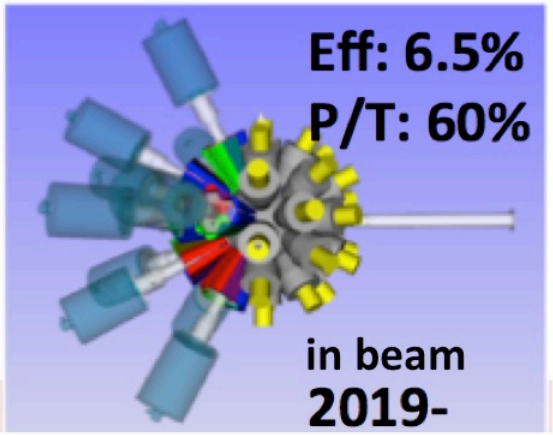
40 GASP detectors
Eff: 4.0 %
P/T: 50%

GALILEO phase II

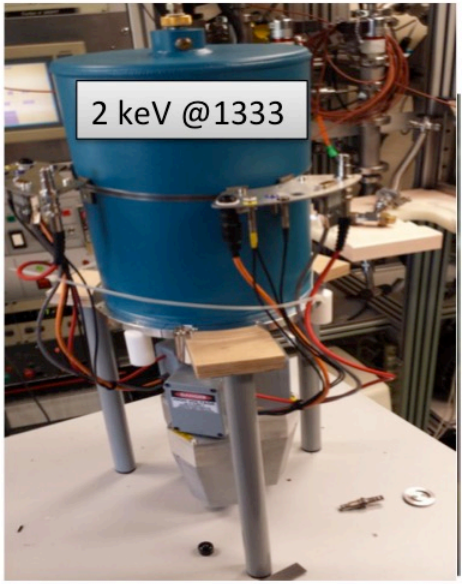
30 GASP +
10 Triple Cluster +
Anticompton



CAD: R. Menegazzo



Simulations by A. Goasduff



The GALILEO II γ-ray spectrometer complementary detectors

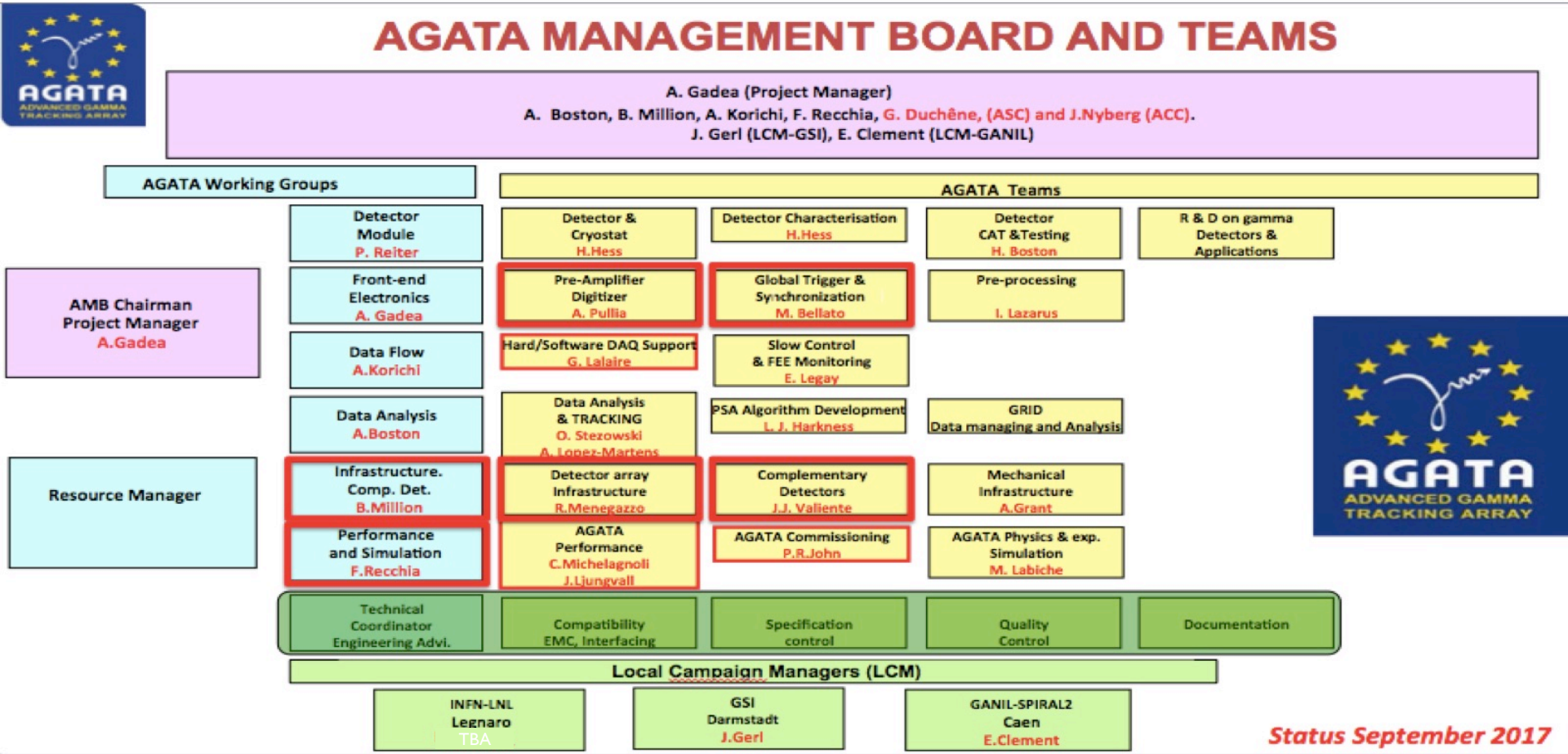
EUCLIDES	**Light charged particles detector (from GAMMAPOOL, EU)**
TRACE	**Identification of A ≤ 10 ions by PSA analysis (INFN)**
PLUNGER	**Lifetime measurements with plunger techniques (from Germany)**
SPIDER	**Si detector for Coulomb Excitation (INFN)**
RFD	**Recoil Filter Detector (from Poland)**
g-factor	Radiation hard segmented detector for heavy ions at forward angles for Coulomb Excitation with stable beams and g-factor measurements with TDRIV technique **(INFN)**
LaBr3 ring	High Energy gamma rays **(INFN)**
MOS	MiniOrange Electron Spectrometer **(INFN)** – (TRIUMF-like design, to be developed within 2022)

DONE** and **Developments on-going

AGATA Steering Committee Italian Members: A. Bracco, G. De Angelis

AGATA Collaboration Council Italian Members: S. Lenzi, B. Million, A. Nannini, D. Napoli

AGATA MANAGEMENT BOARD AND TEAMS

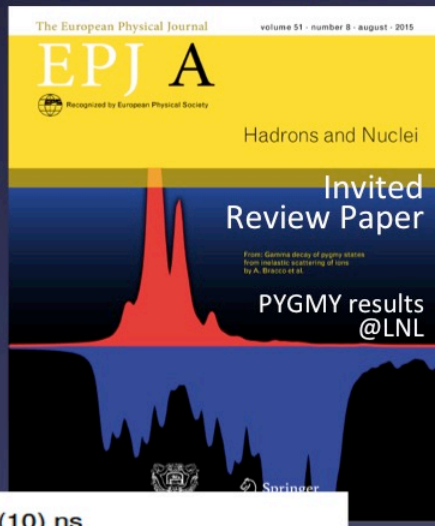


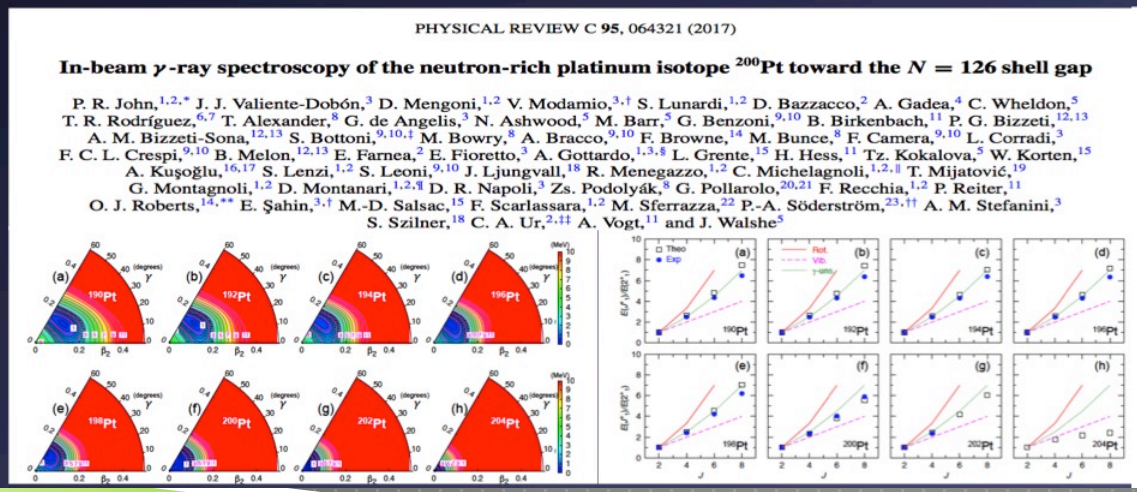
Status September 2017

Publications of AGATA@LNL campaign (2010-2011)

18 Phys. Rev. C + 3 Phys. Rev. Lett.
1 Phys. Lett. B
1 invisted review paper
…

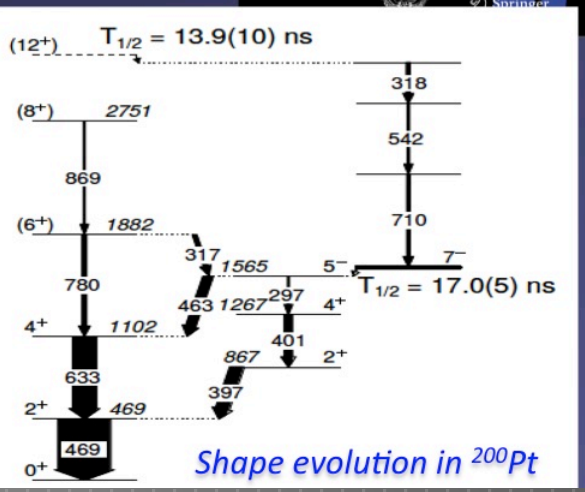
more coming …




PHYSICAL REVIEW C 95, 064321 (2017)

In-beam γ-ray spectroscopy of the neutron-rich platinum isotope ^{200}Pt toward the $N = 126$ shell gap

P. R. John,[1,2,*] J. J. Valiente-Dobón,[3] D. Mengoni,[1,2] V. Modamio,[3,†] S. Lunardi,[1,2] D. Bazzacco,[2] A. Gadea,[4] C. Wheldon,[5] T. R. Rodríguez,[6,7] T. Alexander,[8] G. de Angelis,[3] N. Ashwood,[5] M. Barr,[5] G. Benzoni,[9,10] B. Birkenbach,[11] P. G. Bizzeti,[12,13] A. M. Bizzeti-Sona,[12,13] S. Bottoni,[9,10,‡] M. Bowry,[8] A. Bracco,[9,10] F. Browne,[14] M. Bunce,[8] F. Camera,[9,10] L. Corradi,[3] F. C. L. Crespi,[9,10] B. Melon,[12,13] E. Farnea,[2] E. Fioretto,[3] A. Gottardo,[1,3,§] L. Grente,[15] H. Hess,[11] Tz. Kokalova,[5] W. Korten,[15] A. Kuşoğlu,[16,17] S. Lenzi,[1,2] S. Leoni,[9,10] J. Ljungvall,[18] R. Menegazzo,[1,2] C. Michelagnoli,[1,2,‖] T. Mijatović,[19] G. Montagnoli,[1,2] D. Montanari,[1,2,¶] D. R. Napoli,[3] Zs. Podolyák,[8] G. Pollarolo,[20,21] F. Recchia,[1,2] P. Reiter,[11] O. J. Roberts,[14,**] E. Şahin,[3,†] M.-D. Salsac,[15] F. Scarlassara,[1,2] M. Sferrazza,[22] P.-A. Söderström,[23,††] A. M. Stefanini,[3] S. Szilner,[18] C. A. Ur,[2,‡‡] A. Vogt,[11] and J. Walshe[5]



AGATA @ GANIL: 10/24 Esperimenti approvati con SPOKESPERSON ITALIANO

	Laboratory	Date	Spokesperson	INFN	Title	Status	PAC
2016	GANIL	2015	J.J. Valiente-Dobon	LNL	Study of quadrupole correlations in the 106,108 Sn isotopes via lifetime measurements	Fatto	2014
2016	GANIL	2015	D. Verney, G de Angelis	LNL	Neutron monopole drifts near the N=50 closed shell towards 78Ni	Fatto	2014
2016	GANIL	2015	G. Duchene, G de Angelis	LNL	Test of Z=28 and N=50 gaps in 82Ge and 80Zn	Fatto	2014
2017	GANIL	2016	S. Leoni, B. Fornal, M. Ciemala	MI	Lifetime measurements of excited states in neutron-rich C and O isotopes: a stringent test of the three body forces with the AGATA+**PARIS**+VAMOS setup	Fatto	2014
2017	GANIL	2016	P.R. John, P-A. Soderstrom	PD	Shape transition in the neutron-rich W isotopes **FATIMA**	Fatto	2014
2018	GANIL	2016	S.M. Lenzi, F. Recchia	PD	Effects of Isospin Symmetry Breaking in the A=63 mirror nuclei		2015
2018	GANIL	E730	J.J. Valiente-Dobon, E. Clément , A.Gadea	LNL	Lifetime measurement in 112Xe		2016
2018	GANIL	E731	A. Boso	PD	Isospin Symmetry breaking and shape coexistence in mirror 71Kr-71Br		2016
2018	GANIL	E727	B. Fornal, S. Leoni, M. Ciemala	MI	Gamma decay from near-threshold states in 14C: a probe of clusterization phenomena in open quantum systems		2016
2018	GANIL	E725	B.Cederwall, G.de Angelis, F. Recchia, et al	LNL	Search for isoscalar pairing in the N=Z nucleus 88Ru		2016

2017

2018

~2 experiments/month, up to 313 Tb to the GRID Tiers

NEDA-DIAMANT coupled to AGATA in 2018

AGATA campaign ***approved until 2019***
Additional request for ***AGATA until 2020*** will be sent

To support funds applications for **AGATA 4π** a "**WHITE Book**" will be produced

- **Physics Cases for AGATA in 2021 – 2030 period**
- **Focus on 5 possible Host Laboratories:**

→ **CERN/ISOLDE** – *WG1 (M. Zielińska (chair), P. Reiter (co-chair))*
GANIL/SPIRAL1/SPIRAL2 – *WG2 (B. Cederwall (chair), E. Clément (co-chair))*
GSI/FAIR – *WG3 (A. Jungclaus (chair), M. Górska (co-chair))*
→ **JYFL** – *WG4 (D. Jenkins(chair), Paul Greenlees (co-chair))*
LNL/SPES – *WG5 (S. Leoni (chair), J. Valiente-Dobon (co-chair))*
+ Common WG – *WG6 (ACC chair (chair), ASC and AMB chairs (co-chairs))*

Emphasis on the *particularities* and *uniqueness* of each of the host labs

→ ***Final version to be ready by the end of 2018***

AGATA@LNL/SPES – *WG5 (S. Leoni (chair), J. Valiente-Dobon (co-chair))*

Didier Beaumel (IPN-Orsay)
Giovanna Benzoni (INFN-Milano)
Fabio Crespi (University of Milano and INFN)
Dominique Curien (Strasbourg)
Gilbert Duchene (Strasbourg)
Bogdan Fornal (IFJ-Krakow)
Kalin Gladnishki
Alain Goasduf
Amel Korichi
Roberto Menegazzo
Daniele Mengoni
Adriana Nannini
Daniel Napoli
Johan Nyberg
Georgi Rainovski
Francesco Recchia
John Smith
Magda Zielińska

STARTING POINT:

LOI's for SPES
presented at
SPES WS 2014 and 2016

LOI's for SPES – *2014 and 2016 Workshops*

47 LOIs = 42 (Physics) + 5 (Instruments Installation)
22 LOIs requesting AGATA + Ancillaries

Several experiments each LOI …

AGATA/GALILEO III	22	
+ Large Scintillators	7	→ *PARIS + Large $LaBr_3$*
+ Charged Particles (Coulex)	7	→ *SPIDER*
+ Charged Particles (Transfer)	10	→ *GRIT (GASPARD/TRACE)*
+ Magnetic Spectrometer	4	→ *PRISMA*
+ Plunger	2	
+ Neutron Detector	1	→ *NEDA/NW*
+ Recoil Filter	1	→ *RFD*

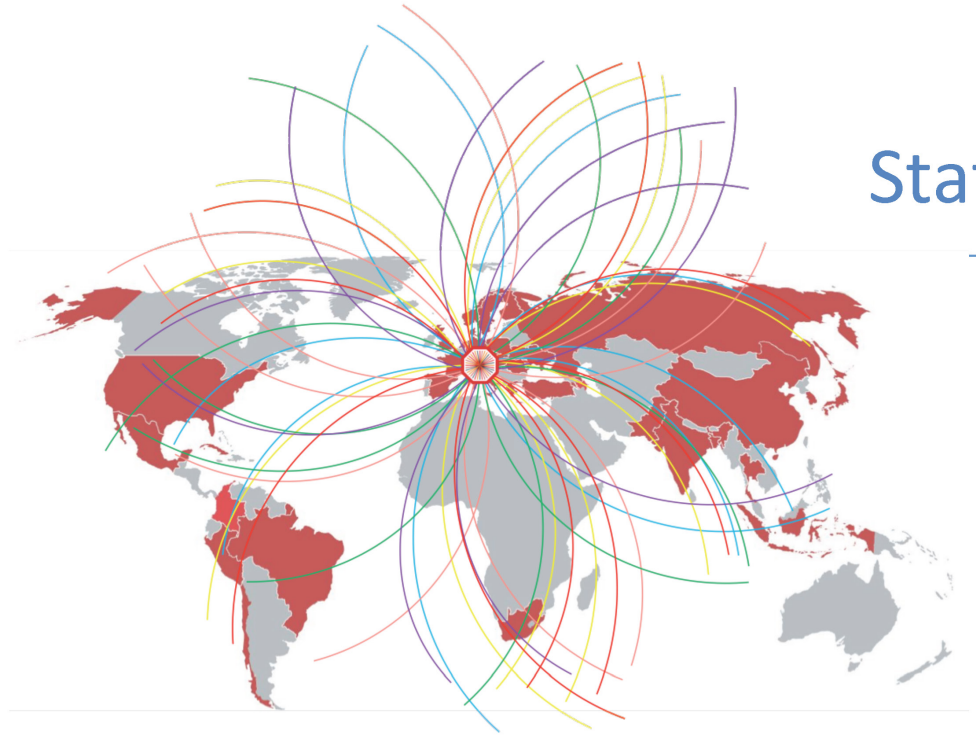
All requested ANCILLARIES are available or under development …

58 ric. con 46 FTE	TOTALE 5y	2018	2019	2020	2021	2022
ISOLDE	SENZA Missioni		Long CERN shutdown 2			
Fasci @ LNL		Shutdown 3 mesi (+2)	Shutdown 3 mesi (+2)	Shutdown 1 anno		
LNL: stabili_1 & 1+ & stabili_2 & RIB	stabili	stabili	stabili	1+	1+, stabili_2	1+, RIB
GALILEO 2	544	357	78	62	23	23
Ancillaries GALILEO	203	32	16	50	56	50
GALILEO 3	650	0	0	0	200	450
AGATA	733	106	243	116	128	0
AGATA @ SPES	500	0	0	250	250	0
TRACE	377	84	73.5	73.5	73.5	73.5
NEDA	54	6	12	12	12	12
R&D HPGe	178	87.5	90	0	0	0
Array Ge - Solenoide ISOLDE	220	0	120	100	0	0
R&D Scintillatori	348	55	65	65	40	35
Tape Station SPES	239	47	121	71	0	0
TOTALE SENZA MISSIONI	4700	920	970	950	940	940

stabili_2: ECR + CB + RFQ + ALPI: fasci civetta - Shutdown LNL: 3 mesi + Agosto & Settembre

PROPOSTA GAMMA 2018-2022

Finanziamento 2018: 635.5 k€ "altro" + 247.5 k€ missioni



ALICE
Stato e Richieste Finanziarie

Vito Manzari

Contributi alle Riunioni della CSN3 nel 2017

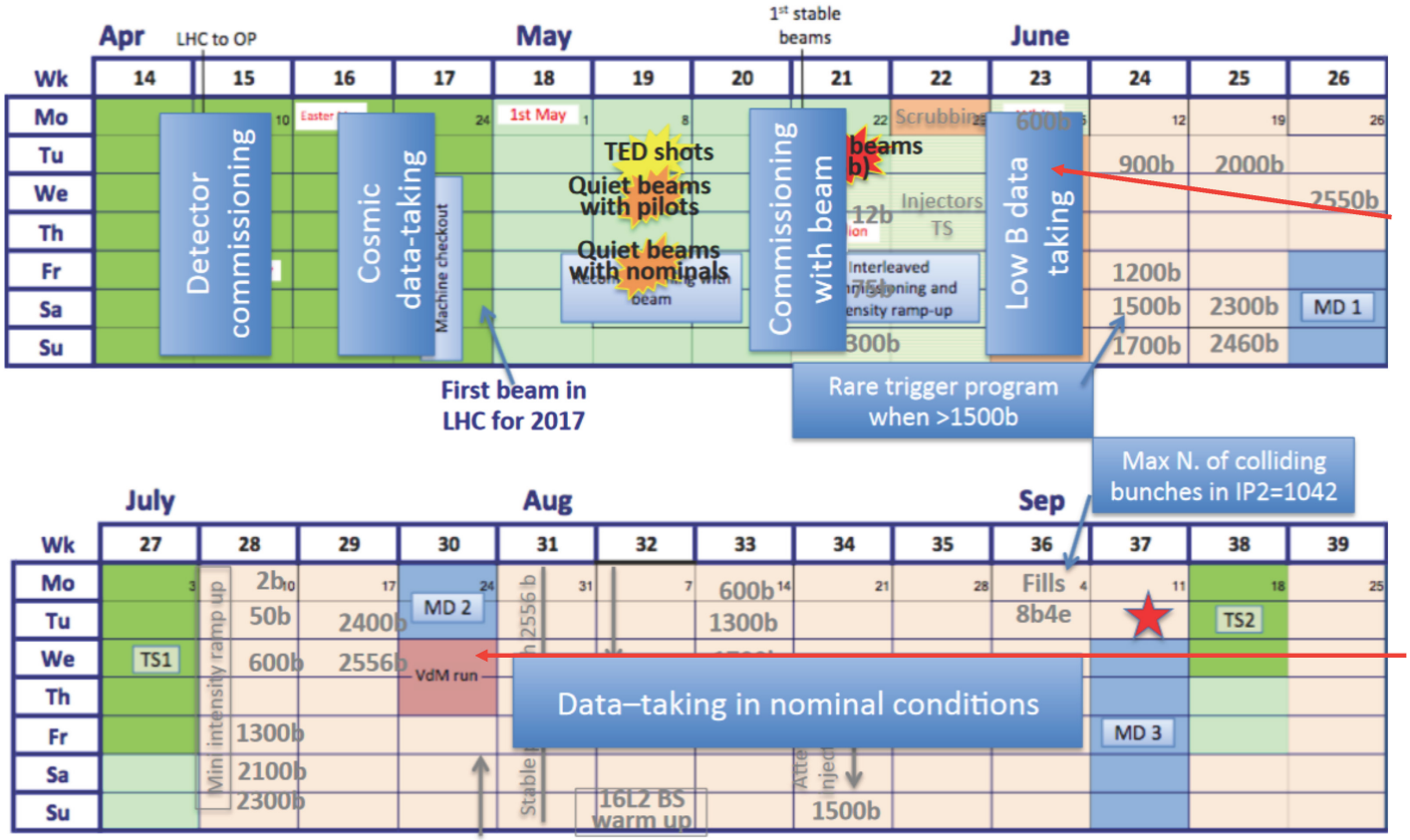
*Settembre - "**Stato e Richieste finanziarie**" e "**Stato upgrades Run3**", V. Manzari e C. Cicalò*

*Giugno - "**Risultati di Fisica**" e "**ITS Upgrade**", G.E. Bruno e V. Manzari*

*Marzo - "**Calcolo**", D. Elia*

Riunione Commissione Scientifica Nazionale 3 dell'INFN
Arenzano, 19 Settembre 2017

ALICE Performance - Data taking 2017



Intense commissioning phase

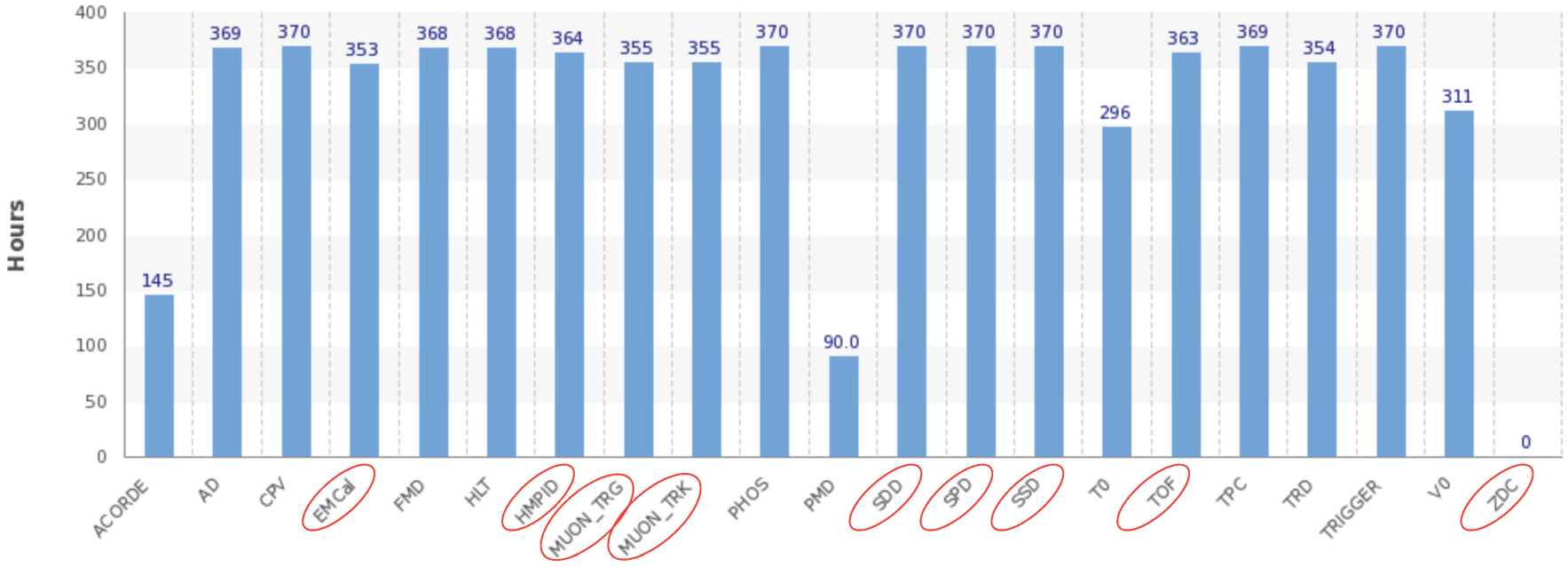
~150 M minimum bias events collected with **reduced magnetic field**

- Study of **di-electron continuum and resonances** in the low-mass region

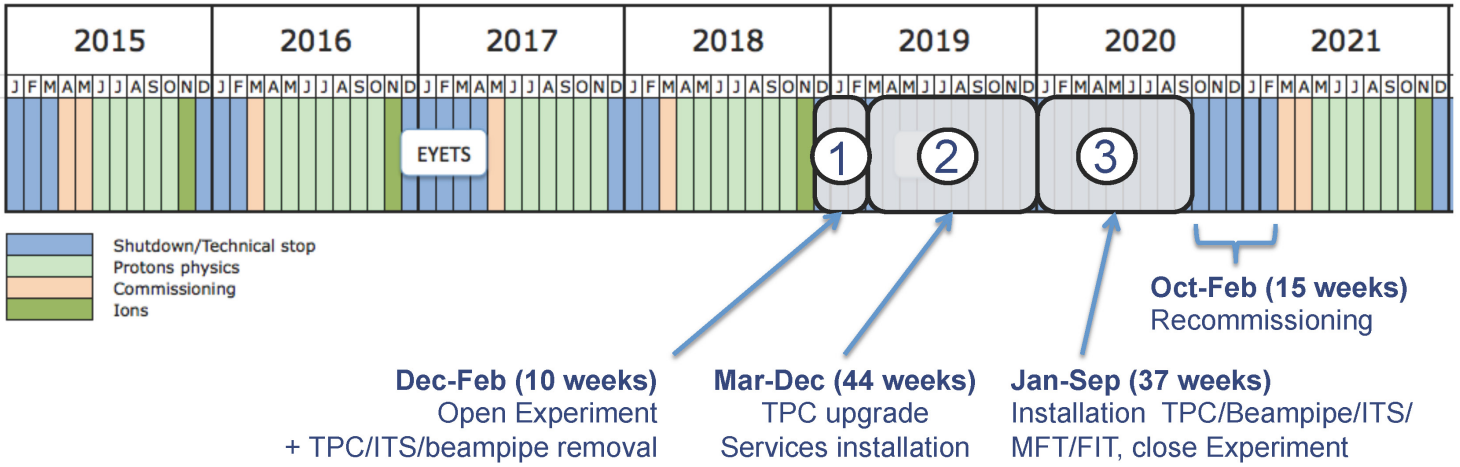
Standard data-taking at a **luminosity of ~2.6 Hz/µb (µ ~ 1%)**

- **~80 M minimum bias events** collected with isolated bunches for **inelastic cross section and diffractive** measurements

ALICE Performance - Detector Participation

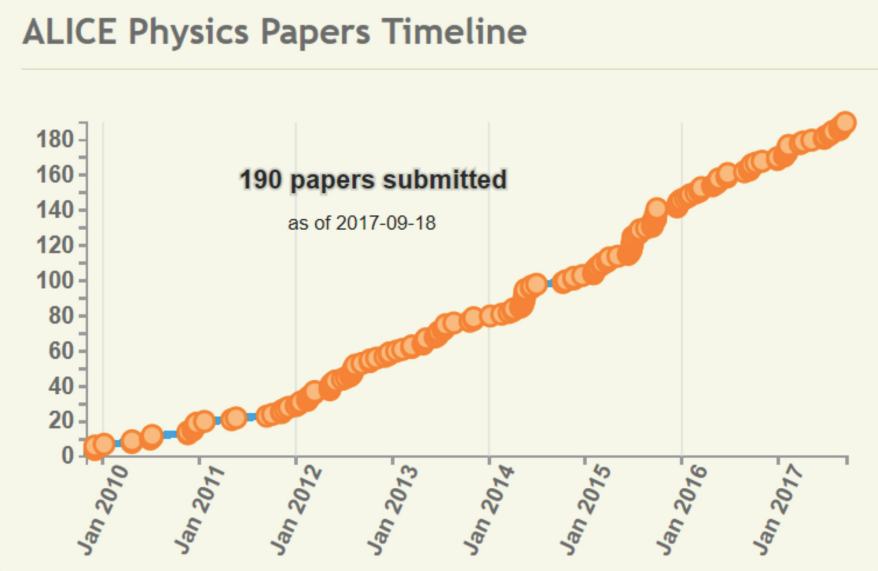


ALICE LS2 Schedule



LS2: from week 50 2018 (beginning Dec) to week 7 2021 (mid Feb)

Scientific Production



Ad oggi, 190 articoli su rivista

Principali riviste: PRL, PLB, EPJC, PRC, JHEP
(ma anche JCAP, Nature Physics….)

Elevato grado di continuità nel livello di pubblicazioni

2017 → 22 articoli (submitted)

2016 → 33 articoli (published)

2015 → 28 articoli "

2014 → 22 articoli "

2013 → 27 articoli "

….

"Famous papers"

Elliptic flow of charged particles in Pb-Pb collisions at 2.76 TeV (672 cit.)

(il più citato di LHC dopo gli articoli sulla scoperta dell'Higgs)

Suppression of Charged Particle Production at Large Transverse Momentum in Central Pb-Pb Collisions at $\sqrt{s_{NN}}$= 2.76 TeV (532 cit.)

Centrality dependence of the charged-particle multiplicity density at mid-rapidity Pb-Pb collisions at $\sqrt{s_{NN}}$=2.76 TeV (501 cit.)

Bilancio 2018 – Borse per Similfellow

Richiesta l'assegnazione di 4 annualità complessive pari a160 kEur

6 candidati con i titoli in regola

Nome	Posizione	Data inizio
	Tema di ricerca	
Mazzilli Marianna (Ba)	III anno PhD	Gennaio 2018
	Studio delle correlazioni angolari tra mesoni D e particelle cariche nei diversi sistemi di collisione ad LHC.	
Jacazio Nicolò (Bo)	III anno PhD	Gennaio 2018
	Studio della produzione di $\pi^{\pm}$, $K^{\pm}$, p e $\bar{p}$ in collisioni Pb-Pb e pp a $\sqrt{s_{NN}}=5.02\ TeV$ e misura del Nuclear Modification Factor (R_{AA})	
Fronzè Gaetano (To)	III anno PhD	Gennaio 2018
	Bottomonium production in Pb-Pb collisions and upgrade of the ALICE muon spectrometer software in view of Run 3	
Ravasenga Ivan (To)	III anno PhD	Gennaio 2018
	Identified hadron pT spectra with Run 2 data and simulation of the expected performance with the new Inner Tracking System in Run 3	
Barioglio Luca (To)	II anno PhD	Giugno 2018
	Analysis of matter and anti-matter production in in pp, p-Pb and Pb-Pb collisions and small systems to validate thermal and coalescence models	
Grosa Fabrizio (To)	II anno PhD	Giugno 2018
	Production of hadrons containing charm and beauty quarks in pp and Pb-Pb collisions at the LHC	

Bilancio 2018 – Richieste CORE per Upgrade Detector

Sommario Richieste CORE per Upgrade e profilo di spesa

Progetto	2014	2015	2016	2017	2018	2019	2020	Totale
ITS Upgrade		353	807	1368.5	265	145	-	2938.5
TOF	35	25	50	330	4.5	-	-	444.5
ZDC	-	-	-	16	41.5	47/71/77	19.5	124/148/154
Muon Tracker		-	-	45	134	88	-	267
Muon Trigger	25	37	42	9	5	42	-	160
Totale	**60**	**415**	**899**	**1768.5**	**450**	**322/346/352**	**19.5**	**3934/3958/3964**

N.B. Il finanziamento per il TOF non rientra nel bilancio della Commissione

ALICE upgrade → strategia

Motivation

High precision measurements of rare probes at low p_T which cannot be selected with a trigger – require large event samples on tape.

Target

Pb-Pb recorded luminosity ≥ 10 nb^{-1} plus pp and p-A data

Improve vertexing, tracking and read-out rate capabilities

Strategy

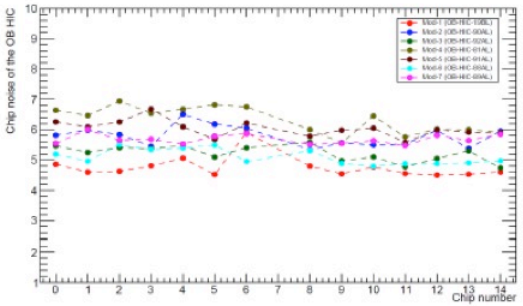
- Upgrade ALICE readout (for several detectors) and online systems
  - Read out all Pb-Pb interactions at a maximum rate of 50 kHz with a minimum bias trigger
  - Perform online data reduction
- New silicon trackers: Inner Tracking System (mid-rapidity), Muon Forward Tracker (forward rapidity)

Corrado Cicalo' 3

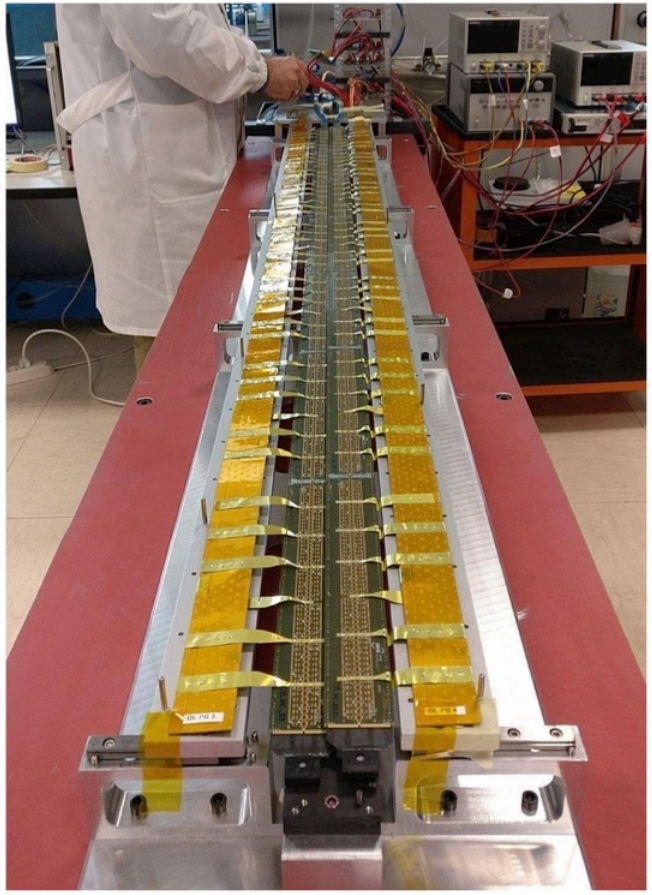
Stato della produzione: STAVE

- La produzione di Stave comincerà nel mese di settembre/inizio ottobre a Torino e LNF

- Stave 0: completato e spedito al CERN per test data transmission
- Stave 1: completato e caratterizzato a TO
- procedura testata e validata fino alla saldatura del PB
- 100% chip funzionanti
- noise compatibile con quello osservato a livello di HIC (6-7 elettroni)



Chip noise vs Chip number
(all HICs on OB-HS-1L)



Corrado Cicalo'

Supporto OB trasferito al CERN il 21 settembre
Complimenti a tutta la squadra!

CONCLUSIONI

- Gli upgrade di TOF, ZDC, e Muon Arm sono componente decisiva programma upgrade ALICE ed è parte significativa (25%) dell'intero impegno economico dell'INFN in tale programma.
- Per TOF, MCH e MID il 2018 è l'anno di produzione in serie
- ZDC è ancora in R&D (2017): test modo continuo. Produzione nel 2018
- ITS: piena produzione nel 2018.

Corrado Cicalo' 47

1) Longitudinal asymmetry and its effect on pseudorapidity distributions in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
arXiv:1710.07975 [nucl-ex].

2) Production of ^{4}He and $^{4}\overline{\textrm{He}}$ in Pb-Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 2.76 TeV at the LHC
arXiv:1710.07531 [nucl-ex].

3) Production of deuterons, tritons, ^{3}He nuclei and their anti-nuclei in pp collisions at $\mathbf{\sqrt{{\textit s}}}$ = 0.9, 2.76 and 7 TeV
arXiv:1709.08522 [nucl-ex].

4) Search for collectivity with azimuthal J/ψ-hadron correlations in high multiplicity p-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 and 8.16 TeV
arXiv:1709.06807 [nucl-ex].

5) J/ψ elliptic flow in Pb-Pb collisions at $\mathbf{\sqrt{s_{\rm NN}}}$ = 5.02 TeV
arXiv:1709.05260 [nucl-ex].

6) Constraining the magnitude of the Chiral Magnetic Effect with Event Shape Engineering in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76$ TeV
arXiv:1709.04723 [nucl-ex].

7) The ALICE Transition Radiation Detector: construction, operation, and performance
arXiv:1709.02743 [physics.ins-det].

8) Kaon femtoscopy in Pb-Pb collisions at $\sqrt{s_{\rm{NN}}}$ = 2.76 TeV
arXiv:1709.01731 [nucl-ex].

9) Systematic studies of correlations between different order flow harmonics in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV
arXiv:1709.01127 [nucl-ex].

10) π^0 and η meson production in proton-proton collisions at $\sqrt{s}=8$ TeV
arXiv:1708.08745 [hep-ex].

11) Charged-particle multiplicity distributions over a wide pseudorapidity range in proton-proton collisions at $\mathbf{\sqrt{s}=}$ 0.9, 7 and 8 TeV
arXiv:1708.01435 [hep-ex].

12) Measurement of deuteron spectra and elliptic flow in Pb–Pb collisions at $\sqrt{s_{\mathrm {NN}}}$ = 2.76 TeV at the LHC
arXiv:1707.07304 [nucl-ex].
10.1140/epjc/s10052-017-5222-x.
Eur.Phys.J. C77 (2017) no.10, 658.

13) Searches for transverse momentum dependent flow vector fluctuations in Pb-Pb and p-Pb collisions at the LHC
arXiv:1707.05690 [nucl-ex].
10.1007/JHEP09(2017)032.
JHEP 1709 (2017) 032.

14) D-meson azimuthal anisotropy in mid-central Pb-Pb collisions at $\mathbf{\sqrt{s_{\rm NN}}=5.02}$ TeV arXiv:1707.01005 [nucl-ex].

15) Measuring K$^0_{\rm S}$K$^{\rm \pm}$ interactions using Pb-Pb collisions at ${\sqrt{s_{\rm NN}}=2.76}$ TeV
arXiv:1705.04929 [nucl-ex].
10.1016/j.physletb.2017.09.009.
Phys.Lett. B774 (2017) 64-77.

16) Linear and non-linear flow modes in Pb-Pb collisions at $\sqrt{s_{\rm NN}} =$ 2.76 TeV
arXiv:1705.04377 [nucl-ex].
10.1016/j.physletb.2017.07.060.
Phys.Lett. B773 (2017) 68-80.

17) J/ψ production as a function of charged-particle pseudorapidity density in p-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV
arXiv:1704.00274 [nucl-ex].

18) Flow dominance and factorization of transverse momentum correlations in Pb-Pb collisions at the LHC
arXiv:1702.02665 [nucl-ex].
10.1103/PhysRevLett.118.162302.
Phys.Rev.Lett. 118 (2017) no.16, 162302.

19) Azimuthally differential pion femtoscopy in Pb-Pb collisions at $\sqrt{s_{\rm NN}}=2.76$ TeV
arXiv:1702.01612 [nucl-ex].
10.1103/PhysRevLett.118.222301.
Phys.Rev.Lett. 118 (2017) no.22, 222301.

20) Production of muons from heavy-flavour hadron decays in p-Pb collisions at $\mathbf{\sqrt{{\textit s}_{NN}} = 5.02}$ TeV
arXiv:1702.01479 [nucl-ex].
10.1016/j.physletb.2017.03.049.
Phys.Lett. B770 (2017) 459-472.

21) Production of ${\pi ^0}$ and $\eta $ mesons up to high transverse momentum in pp collisions at 2.76 TeV
arXiv:1702.00917 [hep-ex].
10.1140/epjc/s10052-017-5144-7, 10.1140/epjc/s10052-017-4890-x.
Eur.Phys.J. C77 (2017) no.5, 339, Eur.Phys.J. C77 (2017) no.9, 586.

22) First measurement of jet mass in Pb-Pb and p-Pb collisions at the LHC
arXiv:1702.00804 [nucl-ex].

PD main contributor

23) Measurement of D-meson production at mid-rapidity in pp collisions at ${\sqrt{s}=7}$ TeV
arXiv:1702.00766 [hep-ex].
10.1140/epjc/s10052-017-5090-4.
Eur.Phys.J. C77 (2017) no.8, 550.

24) Energy dependence of forward-rapidity $\mathrm {J}/\psi $ and $\psi \mathrm {(2S)}$ production in pp collisions at the LHC
arXiv:1702.00557 [hep-ex].
10.1140/epjc/s10052-017-4940-4.
Eur.Phys.J. C77 (2017) no.6, 392.

25) K$^{*}(892)^{0}$ and $\phi(1020)$ meson production at high transverse momentum in pp and Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV
arXiv:1702.00555 [nucl-ex].
10.1103/PhysRevC.95.064606.
Phys.Rev. C95 (2017) no.6, 064606.

26) Production of $\Sigma(1385)^{\pm}$ and $\Xi(1530)^{0}$ in p-Pb collisions at $\sqrt{s_{\rm NN}}=5.02$ TeV
arXiv:1701.07797 [nucl-ex].
10.1140/epjc/s10052-017-4943-1.
Eur.Phys.J. C77 (2017) no.6, 389.

27) Charged-particle multiplicities in proton–proton collisions at $\sqrt{s}$ = 0.9 to 8 TeV
arXiv:1509.07541 [nucl-ex].
10.1140/epjc/s10052-016-4571-1.
Eur.Phys.J. C77 (2017) no.1, 33.

28) ϕ-meson production at forward rapidity in p-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 TeV and in pp collisions at $\sqrt{s}$ = 2.76 TeV
arXiv:1506.09206 [nucl-ex].
10.1016/j.physletb.2017.01.074.
Phys.Lett. B768 (2017) 203-217.

29) Centrality dependence of high-p$_{T}$ D meson suppression in Pb-Pb collisions at $ \sqrt{s_{\mathrm{N}\mathrm{N}}}=2.76 $ TeV
arXiv:1506.06604 [nucl-ex].
10.1007/JHEP06(2017)032, 10.1007/JHEP11(2015)205.
JHEP 1511 (2015) 205, Addendum: JHEP 1706 (2017) 032.

PD main contributor

IL CALCOLO AL CNAF - I

Presentazione D. Cesini

Il Tier1@CNAF – numbers in 2017

- 25.000 CPU core

- 27PB disk storage
- 70PB tape storage (pledged)
- 45 PB used

- Two small HPC farms:
  - 30TFlops dp infiniband interconnect (with GPUs and MICs)
  - 20TFlops dp CPU only Omnipath interconnect

- 1.2MW Electrical Power (Max available for IT)
  - Used 0.7MW
- PUE = 1.6

Access to the farm (CPU)

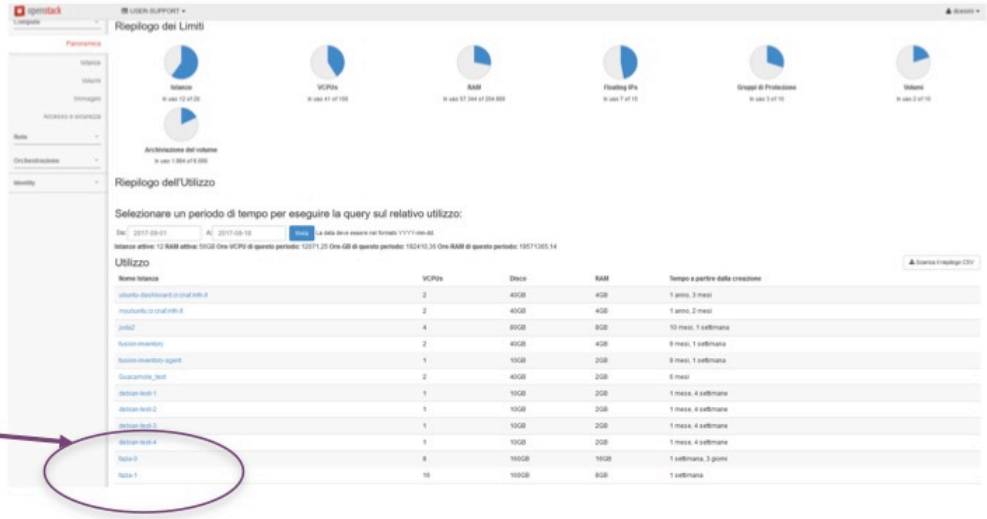
- Grid services with digital certificates authentication
  - gLite-WMS
  - gLite-CE
  - DIRAC
- Local access via "Bsub"
  - Login to bastion.cnaf
  - Login into a User Interface
  - Batch job submission to the farm
    - LSF bsub
- Interactive via Cloud@CNAF
  - New CLOUD infrastructure
    - Not officially funded (yet)

Best fits the needs of small collaboration without a highly distributed computing model

IL CALCOLO AL CNAF - 3

"Cloud" infrastructure

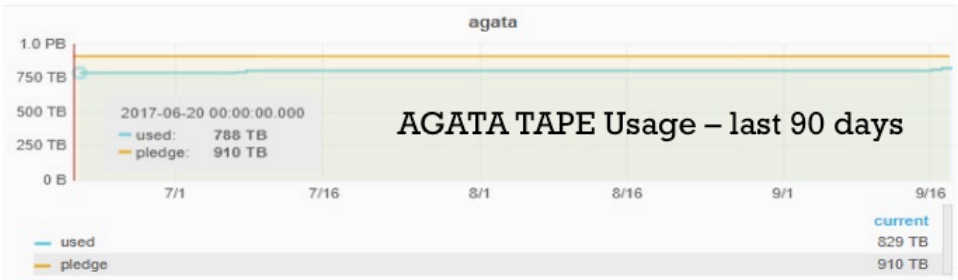
- 1392 VCPUs
- 4.75TB RAM
- 50TB Disk Storage
- Web interface to manage VMs and storage
- SSH access
- FAZIA first use case



IL CALCOLO AL CNAF - 4

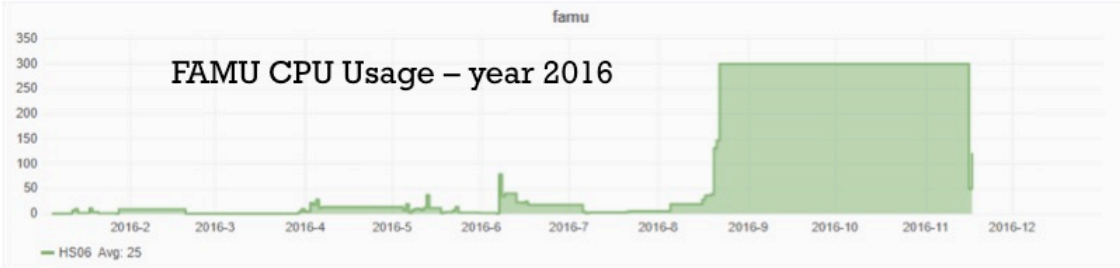
CSN3 Resources at CNAF

Experiment	2016			2017		
	CPU HS06	DISK TB-N	TAPE TB	CPU HS06	DISK TB-N	TAPE TB
Agata/GAMMA	0	0	660	0	0	910
Nuclex	0		0	0	0	0
Famu	250		0	250	10	0
NEWCHIM/FARCOS			150	0	0	300
Totale GRUPPO III	**250**	**0**	**810**	**250**	**10**	**1210**
ALICE	29045	3885	5460	38295	4477	10815
				15%	17%	16%



AGATA TAPE Usage – last 90 days

FAMU Disk Usage: 5TB



FAMU CPU Usage – year 2016

IL CALCOLO AL CNAF - 5

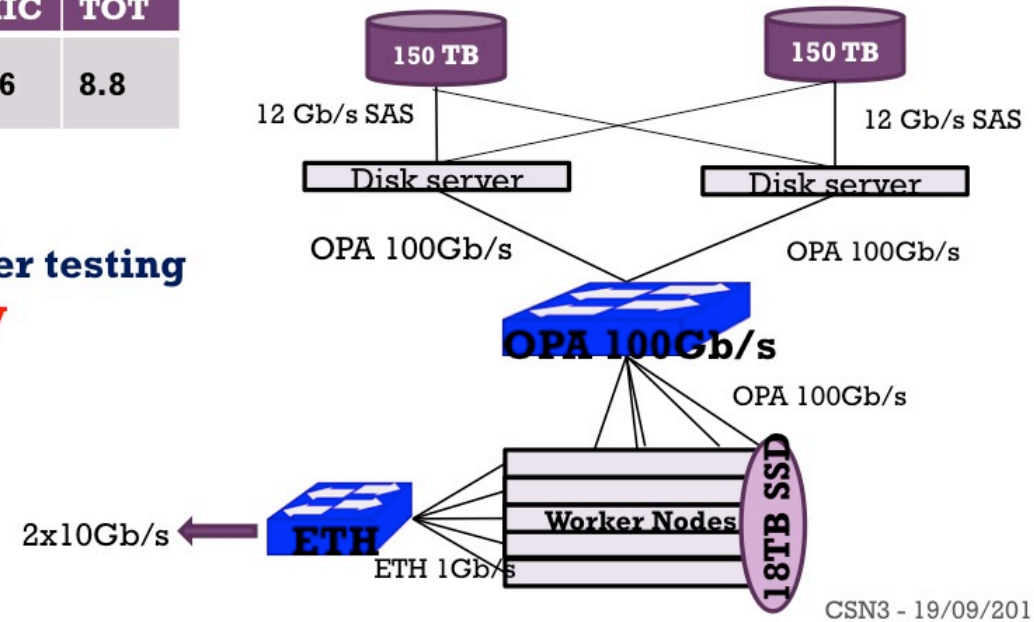
+ 2017 HPC Cluster

- 12 Worker Nodes
  - CPU: 768 HT cores
    - Dual E5-2683v4 @2.1 GHz (16 core)
  - 1 KNL node:
    - 64 core (256HT core)

- Dedicated STORAGE
  - 2 disk servers + 2 JBOD
  - 300 TB shared disk space
  - (150 with replica 2)
  - 18 TB SSD based file system using 1 SSD on each WN – used for home dirs
- OmniPath interconnect (100Gbit/s)
- Ethernet interconnect
  - 48x1Gb/s + 4x10Gb/s

	CPU	GPU	MIC	TOT
TFLOPS (DP - PEAK)	**6.5**	**0**	**2.6**	**8.8**

- WN installed, storage under testing
- Will be used by CERN only
- Can be expanded



Conclusion

- We foster the CNAF data center usage for:
  - Massive batch computation
  - Interactive computing on the Cloud@CNAF infrastructure
  - Experiment data preservation
- Simplified data management services available
  - Not only grid services
- Small HPC clusters are available for developments, tests and small production
  - If needed (and funded) they can expanded
- The User Support team is fully committed to provide assistance in porting computing models to the CNAF infrastructures

BILANCIO E FINANZIAMENTI A PD

Sez. & Suf.	MISS			CON			ALTRICONS			SEM			TRA			PUB			MAN			INV			APP			LIC-SW			SPSERVIZI			TOTALE		
	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.	Sj	Dot.	Ant.
PD.DTZ	12.0																																	12		
	10.0																																	10.0		0
PD	115.0			10.0																					54.0									179		
	68.0			5.0																					39.0	11.0								112.0	11.0	0
PD	4.5	4		5.0																							14.5							24	4	
	3.0	2.0		1.0	1.0																						8.0							12.0	3.0	0
PD	75.0	21		78.0									7.0									26.5			228.0			3.0						417.5	21	
	49.5	4.0		26.0									7.0									7.0			178.0	14.0		3.0						270.5	18.0	0
PD.DTZ	4.0			0.5																														4.5		
	4.0			0.5																														4.5		0
PD	34.0			26.5																		85.0												145.5		
	22.0			18.0																		0.0												40.0		0
PD.DTZ	9.5	3		2.0																		12			16.0									27.5	15	
	4.5	1.5		2.0																		12.0			16.0									22.5	13.5	0
PD	8.0			31.0																		11.5												50.5		
	7.0			18.0	7.0																	8.5												33.5	7.0	0
PD	29.7	2.0		31.7			26.5			14.0			13.0			5.5						22.0						10.0						91		
							26.5			8.5			12.0			3.0						13.0						0.0						63.0		0

AEGIS

ALICE

EXOTIC

GAMMA

JLAB12

LUNA3

GAMMA

NUCLEX

DOT.

Richiesta: 900 k€/ Assegnato: 557.5 Taglio medio 38% (39.5% missioni, 37.4% non-missioni)
Dotazioni: 91/63 (taglio 30.8%)

Bilancio generale (taglio: 37.2 % non missioni, 32.9% missioni)

Sigla	Sez	A carico dell'I.N.F.N.																																	
		missioni		inviti			consumo		altri_cons		seminari			trasporti		pubblicazioni			manutenzione			inventario			apparati			licenze-SW			spservizi			TOTALI		
Totale CSN III		4,098.0	450.5				1,949.0	99.0	126.5	3.0	50.0			147.0	16.0	70.0			260.5	3.0		2,466.5	62.0		2,340.0	64.5		41.5			1,608.0	15.0		13,157.0	713.0	

	MISSIONI		CONSUMO		ALTRI CONS.		SEM		TRASPORTI		PUB	LICENZE SW		MAN.		INVENTARIO		APPARATI		ALTRI SERV.		TOT. PARZIALI		GENERALE
	Assegn.	Sub-Jud	Assegn.	Sub-Jud	Assegn.	Sub-Jud	Ass.	S.J.	Assegn.	S.J.	Ass.	Assegn.	S.J.	Ass.	S.J.	Assegn.	Sub-Jud	Assegn.	Sub-Jud	Assegn.	Sub-Jud	Assegn.	Sub-Jud	
TOTALE GENERALE	2715,5	334,5	1028,5	56	104,5		80,5		103,5	15	33,5	35,5		135,5	28	818	336,5	1306	396	1363	10	7724	1176	8900

FINE

GRAZIE DELL'ATTENZIONE