NuPECC LRP2010

Outline
Rationale

• Nuclear Physics projects involve setting up large-scale Research Infrastructures

  – Needs
    • Strong science case
    • Strong support of scientific community
    • Strong support of policy makers
    • Coherent action of funding agencies

  – Because they are expensive!

• NP projects have very long lead times

  – Needs
    • Considered planning ahead (Forward Looks, Long Range Plans)
Objectives

• Review status of the field
• Put European Nuclear Physics into the worldwide context
• Issue recommendations to advance
  – The science &
  – Its applications in Europe
• Develop action plan
  – Roadmap for
    • Upgrading existing NP facilities
    • Building new large-scale Research Infrastructures
• Collaborate with
  – IAs: HadronPhysics2 and ENSAR
  – Funding agencies: NuPNET
Scientific Issues

• Nature of visible matter in the universe
  – Structure of strongly interacting particles (hadrons)
  – Confinement, QCD vacuum
  – Exotic hadronic matter

• Generation of matter
  – At very high temperatures shortly after Big Bang
  – At very high densities, e.g. in the core of neutron stars

• Nuclear properties 300 → 3000 nuclei
  – Nuclei at their limits of existence
  – Generation of heavy nuclei in cataclysmic cosmic events
  – By use of intense radioactive beams

• Fundamental Interactions
  – Matter dominance in Universe
  – Nature of neutrinos
  – (Violation of) Symmetries

• Applications of nuclear physics for e.g.
  – Energy generation
  – Nuclear Medicine
  – Homeland Security
Hadron (QCD) Facilities

DESY: HERMES
28 GeV e^+ e^-

ESRF: GRAAL
1.5 GeV \gamma

FAIR: PANDA
15 GeV/c anti-protons
ALICE: 5.5 TeV/n HIs
LHeC?

MAX-lab: 0.25 GeV \gamma

TSL: Celsius
1.3 GeV p

FZ Jülich: COSY
2.5 GeV p

ELSA: 3.5 GeV e, \gamma

PSI: 0.5 GeV/c \pi, 125 MeV/c \mu

MAMI: 1.5 GeV e, \gamma

CERN: COMPASS
200 GeV \mu^+, hadrons
ALICE: 5.5 TeV/n HIs
LHeC?

LNF: DA\phi NE
1 GeV e^+e^- Collider
16 MeV K
DA\phi NE-2?

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Nuclear Structure Facilities

GSI: HI beams

IPN-ALTO: (Radioactive) HI beams

SPIRAL 2
Radioactive HI beams EURISOL?

GANIL: SPIRAL
(Radioactive) HI beams

MPi Heidelberg: HI beams

CERN: ISOLDE
Radioactive HI beams HIE-ISOLDE
Radioactive HI beams EURISOL?

MAMI: 1.5 GeV $e,\gamma$

KVI: HI beams

JYFL: HI beams

MAX-lab: 250 MeV $\gamma$

S-DALINAC: 120 MeV $e$

LMU & TU Munich: HI beams

INFN LNL: HI beams

SPES
Radioactive HI beams EURISOL?

INFN LNS: HI beams

FAIR: NuSTAR

EURISOL?
Themes

• Themes
  1) Hadron Structure & Spectroscopy
  2) Phases of Strongly Interacting Matter
  3) Nuclear Structure & Dynamics
  4) Nuclear Astrophysics
  5) Fundamental Interactions
  6) Nuclear Physics Tools & Applications

• NuPECC Steering C’ttee
  1) G. Rosner (Chair)
  2) J.J. Gaardhøje
  3) A. Bracco
  4) P.-H. Heenen
  5) E. Widmann
  6) Ph. Chomaz

• NuPECC Liaison
  1) J. Wambach
  2) Th. Peitzmann
  3) M.J.G. Borge
  4) S. Harissopulos
  5) K. Jungmann
  6) E. Nappi
Working Groups

1) Hadron Structure & Spectroscopy
   - Convener: U. Wiedner (U Bochum)

2) Phases of Strongly Interacting Matter
   - Convener: P. Giubellino (INFN Torino)

3) Nuclear Structure & Dynamics
   - Convener: R. Julin (JYFL Jyväskylä)

4) Nuclear Astrophysics
   - Convener: B. Fulton (U York)

5) Fundamental Interactions
   - N. Severijns (KU Leuven)

6) Nuclear Physics Tools & Applications
   - Convener: S. Leray (IRFU Saclay)
     • Experts: J. Benlliure, A. Boston, M. Durante, S. Gammino, J. G. Camacho, M. Huyse, J. Kucera, P. Moretto, L. Sihver, C. Trautmann
Outline LRP2010

• Recommendations (SC + Liaison + WG-Conveners → NuPECC)
  – Priorities
  – Roadmap (experiment + theory)
• Executive Summary (SC + Liaison + WG-Conveners)
  – Purpose
  – Scientific & societal scope
  – Objectives
  – Summary Themes
  – Summary Research Infrastructures & Networking
• Science Case (WGs)
  – Theme 1 (ca. 20 pages)
  – Theme 2 (ca. 20 pages) …
• Research Infrastructures (SC + Liaison + Lab. Directors + FP7 Coordinators → early feedback to WGs)
  – Description of existing large-scale facilities (1-2 pages each)
    • Upgrade plans (1-2 pages each)
  – Plans for building new Research Infrastructures (ca. 3-5 pages each)
  – Networking: among facilities, with FP7 IAs & funding agencies (NuPNET)
Timelines

• **NuPECC**
  – Summer/autumn 2009: Working Groups meet
  – 12-13 Oct. 2009: Scoping Workshop @ FIAS, Frankfurt
  – 31 May – 2 June 2010: Town Meeting @ CSIC, Madrid

• **ESF**
  – 18 Sept. 2009: Endorsed by Science Advisory Board
  – 1 Oct. 2009: Grant request approved by Governing Council

• **ESFRI**
  – 2011: NuPECC Roadmap → ESF → ESFRI

• **EU**
  – From 2014: Framework 8 Programme to establish the European Research Area, ERA
Tasks WGs

• Finalise lists of
  – Big questions (cf. LRP2010 grant request)
  – Key issues (cf. LRP2010 grant request)

• Decide upon detailed structure of contribution to LRP2010
  – Review recent achievements and the current state of the art
  – Identify open problems and hot topics in the field
  – Develop medium and long-term strategies to tackle them
  – Optimise interplay between experiment and theory
  – Develop the European and worldwide perspective of the field
  – Formulate recommendations and suggest action plan
    (cf. LRP2010 grant request)

• Set up schedule for
  – Telephone & face-to-face meetings
  – Submission of (revised) contributions to SC
  – Involvement of community before town meeting May/June 2010 by e.g.
    • Inviting experts to WG’s face-to-face meetings
    • Organising mini-workshops
    • Putting drafts on NuPECC website
WG’s Contributions

• Introduction to the topic (including “big questions”)
• Conceptual framework (including “key issues”)
• State of the art & future directions (exp. & theor.)
  – Sub-topic 1
  – Sub-topic 2
  – ....
• Future requirements
  – Upgrade/new build of research infrastructures
  – Upgrade/new build of large-scale instrumentation
  – New theory tools
• Conclusions
  – Recommendations
  – Priorities
  – Roadmap

NB: No references
Outline Networking

• Among facilities
  – HadronPhysics2 & ENSAR Research Infrastructures
  – Smaller research infrastructures
  – Future large-scale facilities
    • ESFRI facilities: FAIR, SPIRAL 2, etc.
    • Emerging facilities: EURISOL, EIC, etc.

• With FP7 IAs
  – HadronPhysics2
  – ENSAR
  – SPIRIT?

• With funding agencies
  – NuPNET
    • Use their July 2009 survey of NP resources in Europe
    • Collaborate in developing a vision for Nuclear Physics in Europe
## Schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Actions</th>
<th>Deliverables</th>
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<tbody>
<tr>
<td>12-13/10/09</td>
<td><strong>Scoping Workshop</strong> @ FIAS, Frankfurt</td>
<td>WGs’ final lists of Big Questions, Key Issues &amp; Activities</td>
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<tr>
<td>Oct. ’09-Jan. ‘10</td>
<td>WGs draft Themes’ contribution to LRP2010. SC + Liaison + Lab. Directors + FP7 Coordinators draft RI chapter including networking and provide early feedback to WG-Conveners.</td>
<td>Draft, to SC 15/1/10</td>
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<tr>
<td>12-13/3/10</td>
<td>NuPECC evaluates LRP2010 draft.</td>
<td>List of requested changes</td>
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<tr>
<td>March/Apr. ’10</td>
<td>SC + Liaison + WGs revise draft.</td>
<td>Draft, to NuPECC 1/5/10</td>
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<tr>
<td>May ’10</td>
<td>NuPECC evaluates revised draft. SC + Liaison + WG-Conveners prepare Town Meeting.</td>
<td>Draft, to European NP community 15/5/10</td>
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<tr>
<td>31/5-2/6/10</td>
<td><strong>Town Meeting</strong> @ CISC, Madrid</td>
<td>List of requested changes</td>
</tr>
<tr>
<td>8-9/10/10</td>
<td>NuPECC evaluates revised draft.</td>
<td>List of requested changes</td>
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Guenther Rosner

LRP2010 Scoping Workshop, 12/10/2009

14
Thanks very much for your attention