Alcune News CSN1

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R&D upgrade fase 2 ATLAS/CMS

Decisione del membro di giunta Maggio 2014

- Finanziamento specifico dai fondi premiali 2012 (fuori budget commissione)
- Agreement: Articolato su tre anni e fino ad un massimo di 2.2ME
- Finanziato non sulle sigle Atlas e CMS ma su sigla ad hoc comune tra Atlas e CMS

P-mu2e e g-2

- P-mu2e verso la presentazione al CTS dopo l'estate e nel frattempo situazione vista positivamente in CSN1
- Udine esce da P-mu2e e sposta l'impegno su g-2
- g-2. Test in corso per definire il progetto. Incremento del gruppo italiano e prospettive incremento FTE in 2015 ma gruppo ancora un po' debole

Simil-FIRB

Nando ha deciso:

- le commissioni 1,2,3 finanzieranno ognuna un simil-FIRB di G5
- Bloccati 100KE dal bilancio CSN1

Breve Resoconto sul Workshop on the Long Term Strategy of INFN- CSN1 The next 10 years of accelerator based experiments

Anna Maria Zanetti

Organizzazione del lavoro

- Suddivisione in 4 gruppi:
  - Beyond Standard Model
  - Standard Model
  - Flavour Physics
  - Non perturbative QCD

- Inoltre talk su tecnologie magneti,tecniche di accelerazione,calcolo,rivelatori

- Un pomeriggio di sessioni parallele e il resto tutto in sessioni plenarie

Com'e' stato?

- Un'opportunita' per comprendere il quadro globale e il contesto in cui si svolgera' il prossimo futuro ed in cui vengono proposte le future macchine

- Un buon quadro delle motivazioni di fisica alla base dei diversi progetti

International context: EU

- EU strategy update May 2013
  - *Europe's top priority should be the exploitation of the full potential of the LHC, including the high-luminosity upgrade.*
  - *CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines.*
  - *Europe looks forward to a proposal from Japan to discuss a possible participation.*
  - *Experiments in Europe with unique reach should be supported, as well as participation in experiments in other regions of the world.*

International context: US

- P5 report released May 22, 2014
  - **Use the Higgs boson as a new tool for discovery**
  - Complete the LHC phase-1 upgrades and continue the strong collaboration in the LHC with the phase-2 (HL-LHC) upgrades of the accelerator and both general purpose experiments (ATLAS and CMS). The LHC upgrades constitute our highest-priority near-term large project.
  - Motivated by the strong scientific importance of the ILC and the recent initiative in Japan to host it, the U.S. should engage in modest and appropriate levels of ILC accelerator and detector design in areas where the U.S. can contribute critical expertise.
  - Complete the Mu2e and muon g-2 projects

International context: Japan

- SuperKEKB
  - Full support to Belle2
- J-PARC
  - COMET phase1 funded/started – phase2 future funding
  - KOTO in progress
- LHC
  - Participation to phase2 upgrade (magnets and Atlas)
- ILC
  - Negotiating international cooperation → decision by 2018
  - Potential construction schedule 2021 -2028 (250 GeV option)
    - 360 and 500 GeV will follow

International context: China (1)

- BEPC2
  - Explore full potential
    - 8-10 yr more then need new project
    - Super tau-charm factory does not have large enough scope!
- Limited interest in LHC and ILC

International context: China (2) (slide from FALC presentation)

- Circular Higgs factory fits our strategic needs:
  - Science (great & definite physics)
  - Timing (after BEPCII)
  - Technological feasibility
  - Manpower reality (our hands are free after ~2020)
  - Economical scale (although slightly too high)

A 50-70 km tunnel is very affordable in China NOW

- The risk of no-new-physics is complemented by a pp collider in the same tunnel
  - A definite path to the future
- ee schedule: build 2021-27, physics 2028-35
- pp schedule: build 2035-2042, physics 2042 - ....

Current activities evolution: LHC

- Large INFN involvement ~ 500 FTE/ 60% of CSN1 budget:
  - ATLAS/CMS: Phase 1 fully funded and in progress
  - ATLAS/CMS: Phase 2 R&D funded & starting
  - ATLAS/CMS: Phase 2 upgrades under discussion
    - Logical continuation for INFN-LHC community
    - Strong physics case
    - Strong international support in Europe, US and Japan
    - Construction: 2018 – 2025, data: 2026-2035
      - A long way to get to 3000 fb-1 ..... Is it sustainable?
      - Does TOTEM makes still sense after completion run2 ... (3)?
  - LHCb:
    - Upgrade approved by INFN
    - Construction: now – 2019, data: 2020 - > 2028 ???
      - How long can it really last? How far can we push flavor physics at LHC?
      - Where does the community go?

Current activities evolution: SPS fixed target

- NA62 (rare charged kaon decay):
  - Completing now, data end 2014 onwards
  - Potential extension to neutral kaon channel
    - On paper x2 KOTO statistics, but
      - Real backgrounds still unknown
      - Starts rather late relative to KOTO
      - Is it worth it?
  - Potential HNL search before SHiP with lower sensitivity
    - Should explore potential?
- COMPASS:
  - Upgrade in progress. Resume data taking end 2014
  - What happens after end of this run 2017-2018?

Current activities evolution: Asia

- Belle2:
  - Completing constructions, data 2016 for ~10 yrs
  - Minor upgrade in between running periods
  - What then? Not obvious physics is compelling after that, nor upgrade path
  - Community has interest in ILC if it happens
    - Timing roughly matches/ Could get support from part of LHC communities → this could have implications on LHC experiments
- BES-III:
  - Data taking in progress for 8-10 more years
  - INFN group growing. Participating in tracking chamber upgrade
    - What happens 10 years from now? TLEP or ILC?
- These communities play important role in case of major developments in Asia

Current activities: Muons

- Strong case for CLFV physics
- MEG@PSI:
  - Upgrade in progress. Data 2015-2018.
  - Room for additional update? Potential for joining Mu2e upgrade
- Mu2e@FNAL:
  - R&D/planning fase – critical decisions 2014-15 – data 2020 – 25
  - INFN collaboration getting ready for constrution
    - What are chances for future expansion? Upgrade for PIP-I/II?
- G-2@FNAL
  - R&D/Construction fase – data 2016-19
  - Part of collaboration could merge into Mu2e or upgrade for EDM?

Current activities: KLOE

- DAFNE machine commissioning
- KLOE upgraded and running
  - How long to finish physics program? ~ 3-4 yrs
  - By 2018 need some physics for LNF; what?
    - Energy ugrade to scan hadronic cross section?

(Major) new activities: large colliders

- Lepton colliders:
  - ILC:
    - Is the physics still compelling given the small Higgs mass (can build TLEP for similar or smaller price and have tunnel for pp)?
      - Room for new physics after LHC results is reduced.
    - Decision will be political in the end (or major discoveries at LHC?)
    - If ILC goes on should participate: it will be the first leptonic Higgs factory
      - «Higgs can potentially couple wildly» → detailed study is mandatory!
  - TLEP (CERN or China):
    - An attractive possibility, but needs a large tunnel
    - Feasiblity/cost in CERN area still to be verified (?)
    - Is China serious or is it just politics?
- Better keep all options open to these possibilities

(Major) new activities: large colliders

- Hadron colliders O(33-100 TeV):
  - Largest discovery power!
  - Need tunnel and new generation of magnets
    - Magnets ready for construction ~2025, industry could start delivery 2030 with completion few years later
    - In LHC tunnel could upgrade energy to 33 TeV if nothing else happens in the world
      - Is factor 3 sufficient? Cost is ~ 7 BCHF! Depends on discoveries!
    - If aim to 100 TeV large tunnel (~100 km):
      - Can it really be done in CERN area? Can EU sustain the cost?
      - If China goes ahead, what is the future of CERN? CLIC?
- LHeC (... and american variants EIC etc ...)
  - Besides specific physics large reduction of pdf systematics
  - May leave something in EU if energy frontier goes to Asia

(Major) new activities: large colliders

- Many questions few answers yet
  - Large collider game will go on for a few more years before taking shape.
  - Potential discoveries from LHC can dramatically change the scenario

E ora?

- Stilare documento: out per Natale
  - Come da scopo del workshop: Focus sui prossimi 10 anni ma inserito nel contesto globale dei prossimi vent'anni

- Editori: Roberto Tenchini (sperimentale e chair), Gino Isidori (teorico), Marco Rescigno (membro CSN1)