




The future

- Future projects in particle physics
 - Many (not all) presented in session about future projects and machines (focus on large projects), but many more discussed in other sessions (smaller but still very significant projects)
 - Roadmap processes
 - What is foreseen in the coming years (examples from Europe, US and Japan)
 - Some challenges and questions
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Energy frontier

- LHC upgrade plans (Bailey)
 - Luminosity upgrade 2020, running until 2030
 - Energy upgrade linked to high field magnets
- ILC (Barish)
- CLIC (Schulte)
- Muon collider (Hanson)



Muon Collider Conceptual Layout

Project X
Accelerate hydrogen ions to 8 GeV using SRF technology.

Compressor Ring
Reduce size of beam.

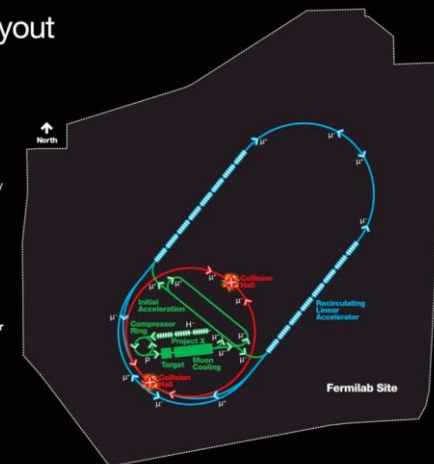
Target
Collisions lead to muons with energy of about 200 MeV.

Muon Capture and Cooling
Capture, bunch and cool muons to create a tight beam.

Initial Acceleration
In a dozen turns, accelerate muons to 20 GeV.

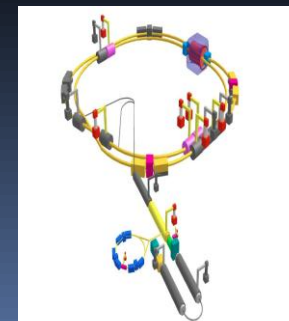
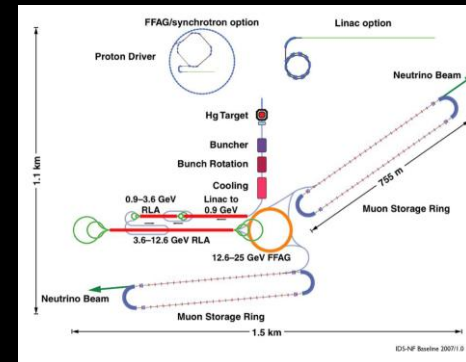
Recirculating Linear Accelerator
In a number of turns, accelerate muons up to 2 TeV using SRF technology.

Collider Ring
Bring positive and negative muons into collision at two locations 100 meters underground.



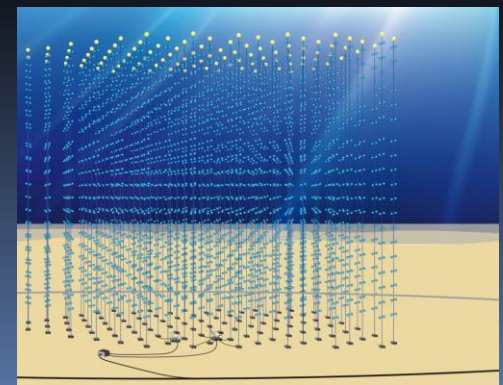
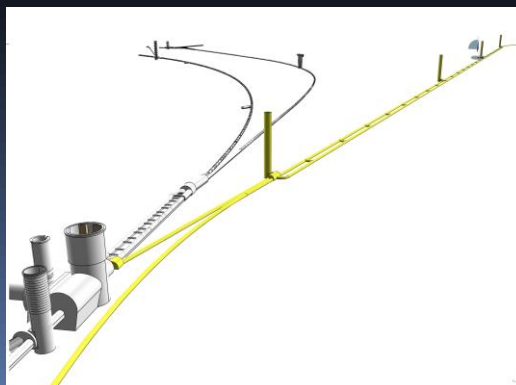
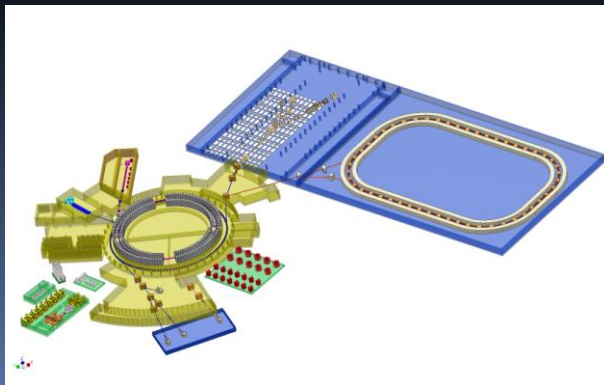
Neutrino and Flavour Physics

- Project X (Tschirhart) and associated precision physics and neutrino program
- JPARC plans not presented in this session but first results this morning
- Neutrino factory (Long)
- SuperKEKB (Iwasaki) and SuperB (Giorgi) aiming for $10^{36} \text{ cm}^{-2} \text{ s}^{-1}$



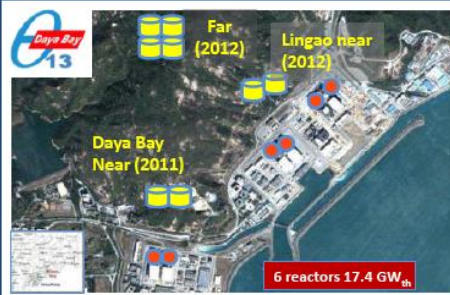
More

- NICA at Dubna, heavy ion collisions (Trubnikov)
 - Obviously there are many others “heavy-ion or nuclear” physics projects – operating, being build or planned
- A Large Hadron Electron Collider (combing LHC with an electron ring or linac) (Klein) was presented
- Only one astroparticle project presented in this session (KM₃Net - Kooijman) but if we look globally we have a VERY LARGE SET of additional important projects in this area - in the implementation or planning phase



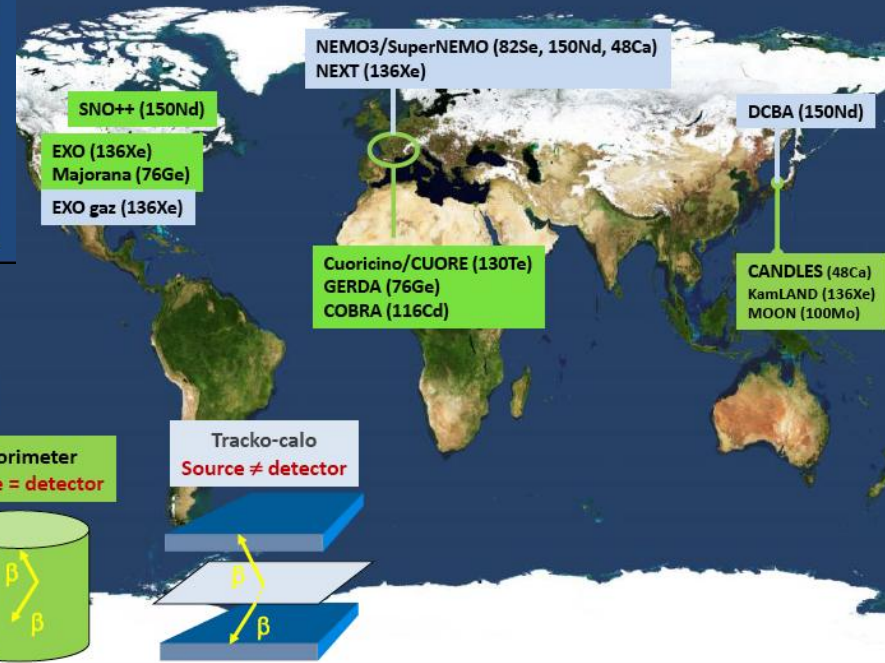
... and more from this morning

Reactor neutrinos

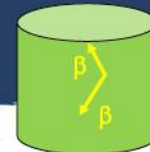


	Location	Thermal Power	Distance Near/far	Depth Near/far
Double Chooz	France	8.5	410/1050	120/300
RENO	South Korea	17.3	290/1380	120/450
DAYA BAY	China	17.4	360/1985 500/1613	260/910

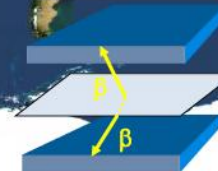
$\beta\beta(0\nu)$: experiments and projects



Calorimeter
Source = detector



Tracko-calorimeter
Source ≠ detector



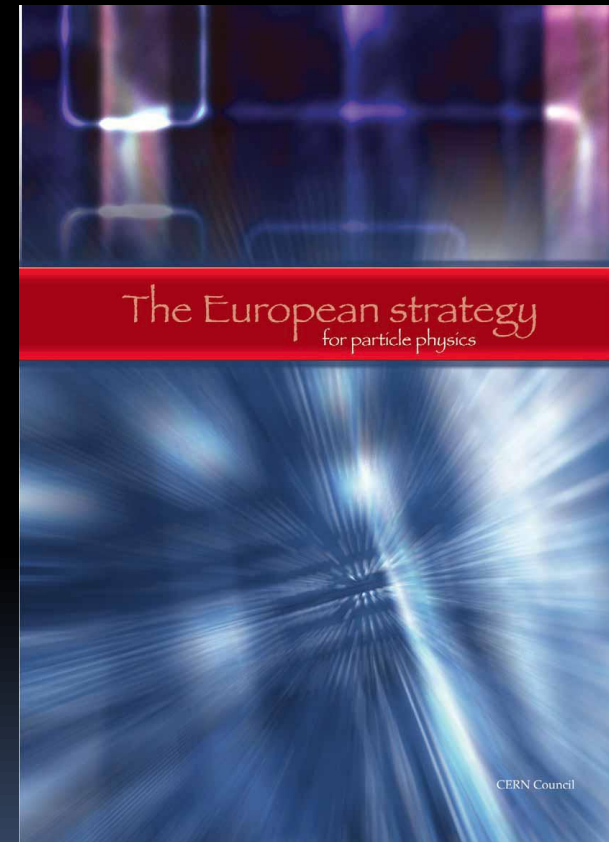
Future Machines and Projects

- Even without being complete there are many ambitious projects ahead of us – boding well for the future
 - Several of the projects are very large
 - Scientific guidance (physics results) needed to choose the best way forward
 - Accelerator development – and personnel (physicists and engineers) - is probably the other main hurdle
- Several of the projects are of “global” scale
 - How and when to decide ?
 - Who to decide ?

The European Strategy

Steinar STAPNES

- Established in 2006
- Will be updated in 2011-2012
 - Start in Council meeting in March 2011 (remit, timelines, process)
 - EPS conference Summer 2011 kick off (Grenoble)
 - Aim for a wide international participation in the process – how do we best do this ?
 - Open community meeting Spring 2012
 - Conclude September 2012



Japan

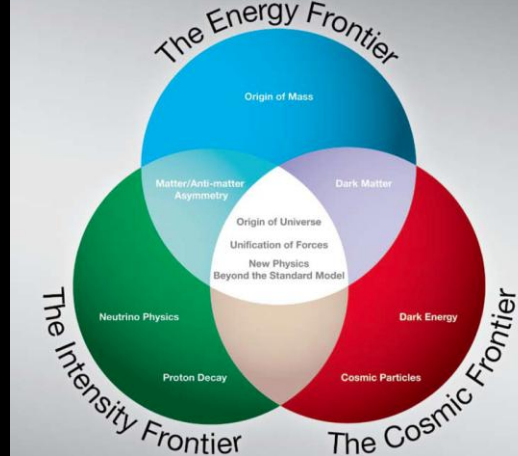
Hiroaki AIHARA

- Current strategy defined in 2006
- March 2010, Science Council of Japan published Master Plan for large scale projects:
 - SuperKEKB
 - JPARC upgrade
 - ILC (regardless of its site)
 - Large Neutrino Detector
- Update of roadmap most likely by the end of 2012



US

MeI SHOCHET



US Particle Physics: Scientific Opportunities A Strategic Plan for the Next Ten Years

- Strategy developed in 2008
- Updates will be informed by data (LHC, θ_{13} , dark matter) and budget reality
- Energy Frontier: CDF/DO completion, LHC, lepton collider R&D
- Intensity Frontier: high sensitivity ν program, rare processes
- Cosmic Frontier: dark energy, dark matter, cosmic rays

Final slide – for discussion

- Additional there are many other important national roadmaps
- One can conclude that the ambitions are high
- Important physics results/guidance are needed
- Timescale of important decisions 2012 ++ some years
- Are we putting enough emphasis on accelerator development ?
- Are we ready to make global decisions about global projects ?
- In a scenario with less resources than we would like, how do we make the right priorities (again globally) ?