Regional Flavour Factories followed by ECFA

“One of the ECFA roles is an incubator for new ideas helping them to grow to the next stage”

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Recent ECFA activities on flavour physics


- Presentation on tau-charm factory projects by Novosibirsk (BINP) and Turkey to PECFA 26-27.11.2010. Progress to be followed.

- Presentation of tau-charm factory project by BINP to RECFA 12.3.2011. RECFA recognised the physics case for a tau-charm factory, and saw that its scale was a national project. This has been communicated to BINP
• Conclusions of the 2008 studies

Physics III

• By 2015, LHCb will explore 10 \( fb^{-1} \) of data. A step beyond the “LHCb” era for an e^{+}e^{-} machine requires >50 time more statistics than now to unambiguously establish any effects of beyond the Standard Model for those, which exhibit no sign now, or which may appear in a couple of years at LHCb (more “inclusive” \( \Delta B = 1 \) \( b \to s \) and \( b \to d \) studies may become important?).

• LFV, e.g. \( \tau \to e\gamma \) would be a big issue. (interesting to see what \( \mu \to e\gamma \) will say in coming years)
• Conclusions of the 2008 studies

Physics III

• The main goal of PEB-II and KEKB was a quantitative test of the KM mechanism of CP violation from the $B_d \rightarrow J/\psi K_s$ decays.
  ⇒ CKM parameters were known enough to make a good prediction for the required luminosity at the time of their construction.

• For a SuperB project, there is no "success guaranteed" minimum luminosity, since we don’t know the New Physics parameters.
  ⇒ But this is the case for the most of the high energy frontier accelerators too.
• Conclusions of the 2008 studies

Conclusions I

• Flavour physics is an important part of the European particle physics programme. Rich physics programme.

- European Strategy Document already recognises a flavour physics facility as a national or regional activity-

• An e⁺e⁻ collider at Y(4S) energy region would be a significant milestone if

  - much more than 50 ab⁻¹ data by the end of ~2020
  - moderate cost
Conclusions II

• INFN Project addresses these points by
  – Very high luminosity $>10^{36}$ with a unique machine concept
  – Reutilizing PEP-II and BaBar parts

• Machine R&D for the TDR should be strongly supported to show that the concept can be realised. (R&D is also useful for the future machines. Continue collaboration with KEK?)

• Still large amount of work needed for the TDR and a strong team of machine physicists and engineers centrally located should be formed very soon.

Geneva, 28 Nov 2008

T. Nakada
Conclusions of the 2008 studies

Conclusions III

- A strong team of experienced machine physicists should be prepared for the operation to achieve the required performance.

- For considering an approval, there should be
  - a clear plan containing realistic technical milestones
  - a description of required resources and concrete strategy how to obtain them

with a goal to achieve much more than 50 ab$^{-1}$ data by $\sim$2020 to make a meaningful impact. If much later than this, physics landscape could be drastically different.
• **Two new inputs since then**
  
  – SuperKEKB changed its design from a high current scheme to the INFN scheme using small emittance beams, and its construction has started.
  
  – LHCb has started to take data delivering expected performance, i.e. substantial achievement could be expected from LHCb before SuperB factories start data taking.
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• Final remarks
  – ECFA believes that the previous conclusions remain valid and hope that issues given there will be addressed in appropriate time
  – Even the INFN SuperB machine is a “national project”, its fate has an impact on the European particle physics. This could be a relevant issue for the Strategy Session of CERN Council.
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• **RECFA Remarks made for Novosibirsk tau-charm factory**
  
  – High precision tau and charm physics
    • important in itself
    • provide crucial information for the interpretation of measurements by the flavour physics experiments at the LHC and the Super B Factories
  
  – Unique advantage of working at the tau/charm threshold
  
  – Such a machine could be built as a national project and BINP has necessary expertise