SuperB Factories and ECFA

INFN SuperB Workshop in Elba, May 2011

- Recent ECFA activities on Flavour Physics
- Conclusions of the 2008 studies
- Two new inputs since then
- Final remarks

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- Recent ECFA activities on flavour physics
  - Review on the INFN Super B Factory project March 2008 to November 2008 by RECFA working group. Report endorsed by PECFA 27-29.11.2008
  - Presentation on tau-charm factory projects by Novosibirsk and Turkey to PECFA 26-27.11.2010. Progress to be followed.
  - Presentation of tau-charm factory project by Novosibirsk. RECFA recognised the physics case for a tau-charm factory, with uniqueness of a threshold machine and input for B physics, and saw that its scale was a possible national project.

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- 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" $\Delta B=1$ $b\rightarrow s$ and $b\rightarrow d$ studies may become important?).
- LFV, e.g. $\tau\rightarrow e\gamma$ would be a big issue. (interesting to see what $\mu\rightarrow e\gamma$ will say in coming years)

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- 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.

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- 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

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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.

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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 ~2020 to make a meaningful impact. If much later than this, physics landscape could be drastically different.

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→ See presentations on both projects later

- 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 a significant impact on the European particle physics, hence ECFA should play some role
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