



STANFORD LINEAR ACCELERATOR CENTER

Mail Address

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Dear SLAC EPAC Committee Members,

PEP-N using an electron ring:

We presented a design for the PEP-N collider at the Fall 2000 EPAC meeting using a 500 MeV e- ring colliding with the LER (PEP-II). The committee made several recommendations for this ring and here are our responses. 1) Increased energy range: We have increased the upper energy to 800 MeV to reach the J/ψ . We continue to work on reducing the lowest ring energy below 150 MeV. 2) Beam-beam studies: We have studied the beam-beam effect and conclude that the coherent modes with different sized rings will be damped by the feedback systems if they exist. However, single particle resonances do appear about every 0.02 in tune space. These resonances are likely manageable as the resonance orders are very high. 3) Polarization: Longitudinally polarized e- beams are possible but spin rotators must be added to the ring.

Furthermore, we have significantly upgraded the IR design to reduce potential backgrounds and for easier construction. We believe the ring design is in much better shape now. All these changes can be reviewed in the updated LoI for the ring which is attached. Unfortunately, a result of the energy increase is to increase the expected cost from 9.9 M\$ to about 15.5 M\$.

PEP-N using an electron linac

At Snowmass 2001, we revisited the use of a linac to supply the electron beam for PEP-N looking not at a cw low current recirculating linac but at a high-charge pulsed linac using copper SLAC linac structures. As it turns out, a linac-ring collider design is possible which provides about $2.5 \times 10^{30} / \text{cm}^2 / \text{s}$ luminosity using a SLC-like linac. A second LoI using a linac is also attached.

Compared to the ring based collider, the linac based machine can reach the Φ at 80 MeV e- as well as the J/ψ , will cost less than half as much, and can easily provide longitudinal polarization at the interaction point. We believe there are essentially no beam-beam issues for PEP-II and BaBar. The present IR design and physics detector are essentially unchanged. At 350 MeV both ring and linac based designs have about the same luminosity. The ring has more luminosity at high energies but the linac has more luminosity at low energies. Because of the significantly reduced cost and no beam-beam issues, we are concentrating our efforts on the linac based design and will spend a lot of our time at the September EPAC review presenting the linac solution.

Best regards and thank you again for your help.

Sincerely,

John T. Seeman
Head of the Accelerator Department
SLAC