

# Colliding Nanobeams: What Do We Need to Demonstrate?

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# What I'm going to do and not going to do

I'm not going to make a list of my favorite hot topics and demonstration proposals

The session organizers have much better lists from their better knowledge

The TRC report will have a list soon, and half of you are on it anyway

I'm not going to prioritize the list that I'm not making

I am going to try to put some perspective on what we should be worrying about

I am going to propose some criteria for prioritizing R&D

I am going to give my opinions on the case for actual colliding beam tests



# Why aren't we already building the LC?

Because it's not approved yet, stupid! But why isn't it approved?  
(I'm not being the devil's advocate here, I'm just repeating what I've heard him say...)

## Cost:

If it were only \$1B, we probably would be building it now

If it were only \$100M, we would probably be building several..

## Case:

The physics case is good, esp. for a light Higgs, but it's easy for opponents to argue that we should wait for LHC results before a funding decision  
LHC argues it gets two discoveries: Higgs and supersymmetry (or equivalents) vs tedious detailed studies confirming "old physics like the Higgs."

We need to better sell particle physics to the public and other scientists...

We should not be shy about making the LC spinoff case as well:  
there are other uses for superconducting RF, vibration control, nanobeams...

## Competition:

When there are several technologies, it's easy for opponents to argue that the community should pick a winner before a funding decision

It would help if we really could pick a winner...

When there are proposals tied to particular sites, it's easy to argue that we're doing it to keep labs alive rather than for physics

It would help if all the lab directors would pledge to participate in a linear collider project, independent of site and technology, before funding...

## Credibility:

6 little words: Ten thousand times the SLC luminosity??

Multibunch, emittance, focusing, control



# How to Prioritize R&D and Test Facilities

Does it address one of the “4 Cs” that keep the project from being approved?

Absolute cost is the important thing, not relative cost of  $10^{-3}$  of the project

Energy reach/upgradability does matter for SUSY, etc. on the physics case

Actually picking winner technologies is a good thing

Being seen to cooperate on things is a good thing

Demonstrating that the less-than-credible can be done is a good thing

Doing too many tests may be interpreted as showing we don't believe we can do it!

Does it help us avoid making a mistake that is fixable but costs money or time

SLC arc design, SLC backgrounds, SLC damping ring size....

But I suspect these were not the things we would have done R&D or demos on...

Is a test facility the most cost-effective way of making progress?

Costs are money, time, manpower (taken from other design and R&D efforts)

Alternatives are calculation, simulation, less-integrated tests, existing facilities

Is a test facility really developing or demonstrating something novel?

Some things really will work as designed and don't need to be prototyped

Some things arguably already have been demonstrated well enough



# Why Collide Nanobeams? Why Not?

The best beam diagnostic is another beam

At SLC, deflections and luminosity were far better than single-beam diagnostics  
FFTB had to struggle more than a bit to find a credible way to demonstrate spots

Directly addresses credibility of demagnification and control

But what is the increment vs old or new single-beam FFTB demo?

If short FF's don't work, or take years to learn to tune, we might avoid giving away space  
but do you need a second beam? or even a real beamline vs tuning many sims?

It's an opportunity to be seen cooperating

both with each other, and with detector people on integration

Colliding beams for weeks instead of measuring a single beam for helps credibility  
trying and failing hurts credibility, perhaps for irrelevant reasons

