



Toward the International Linear Collider

Understanding our Universe

- What is matter made of?
- What happened after the big-bang?
- Do anti-matter behave like matter?
- Can we produce black holes?
- What is dark matter?

Particle accelerators are like “cosmic microscopes”

A new generation of particles accelerators

- The Standard Model of Particle Physics was confirmed at LEP.
- LEP results indicate that new particles could be discovered soon.
- A more powerful accelerator, the LHC, has replaced the LEP.

New phenomena are likely to be discovered at the LHC

Adding precision to power

- The LHC will scan wide areas to discover new particles but with a limited precision.
- A machine with different properties could focus on the particles discovered at LHC.

The ILC brings precision to the LHC discoveries

Challenges for a new accelerator

- Circular accelerators can not accelerate electrons to very high energies. Only linear accelerators can.
- In a linear accelerator the beam is not recirculated, thus an important acceleration must be given to the particles.
- The accelerator will be 40 km long but its parts have to be aligned within a few micrometers!

Many technical challenges need to be addressed before the ILC can be built.

Making the collisions happen

The UK groups have decided to focus their work on the beam delivery: make the collisions happen.

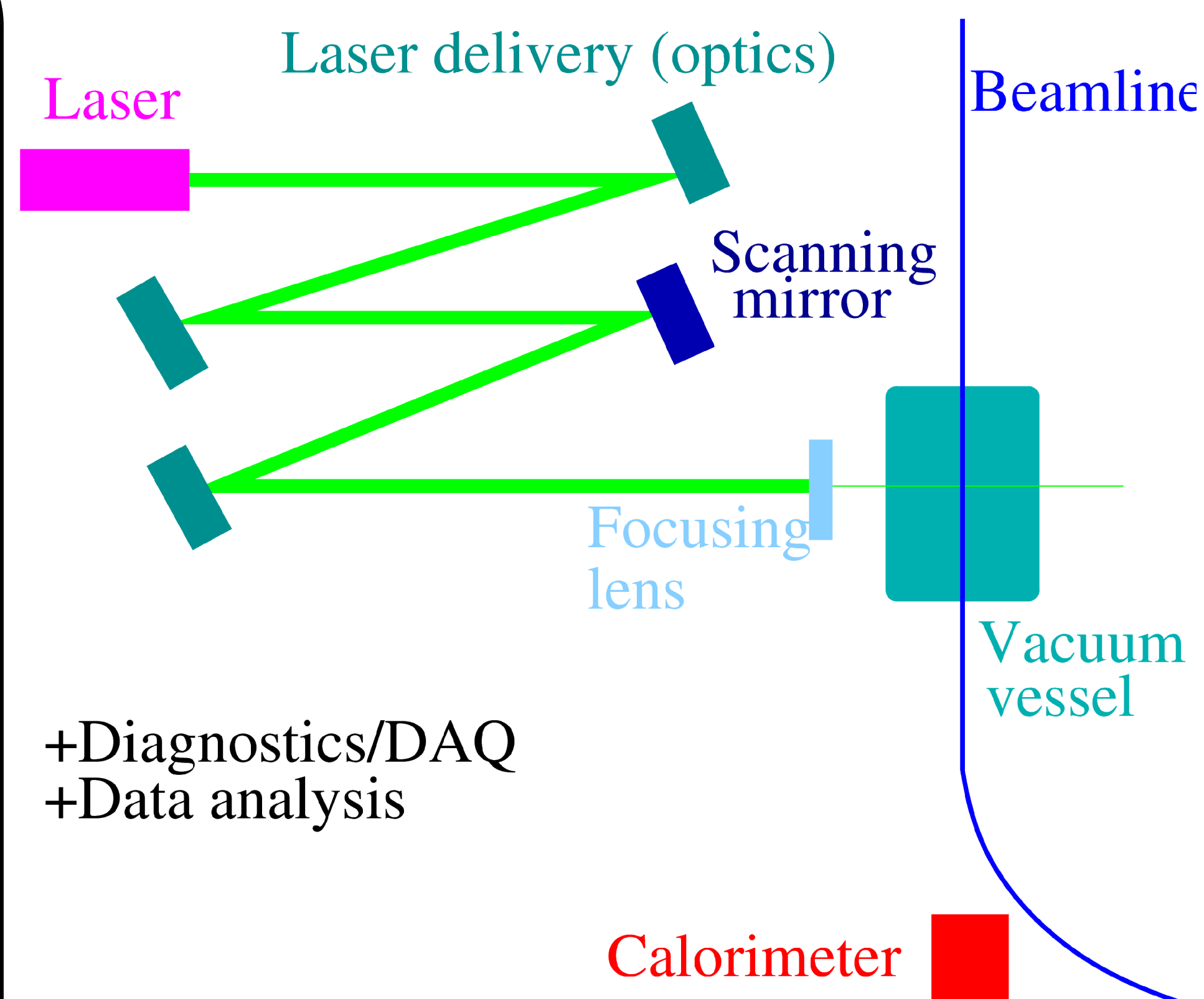
- How to focus the beam strongly enough to produce the desired particles?
- How to dispose of the beams after collisions?
- How to cancel the effect of cultural vibrations and ground motion?
- How can we measure and adjust the beams size?

Beam diagnostic are necessary for the ILC

Laser-wire R&D

- A laser swiped across a particle beam produces compton photons.
- This distribution gives the beam size and hence its emittance.
- => Need to prove that we can reach the required resolution.
- => Need to build a suitable laser.

Applications beyond the ILC (light sources, ion accel.,...)



The ATF laser-wire

- The ATF has the smallest emittance in the world.
- Our goal: achieve a resolution of the order of a micrometer
- The design of the optical lens is very challenging.

Improving the resolution by a factor 4 saves a factor 2 in ILC BDS beamline length!