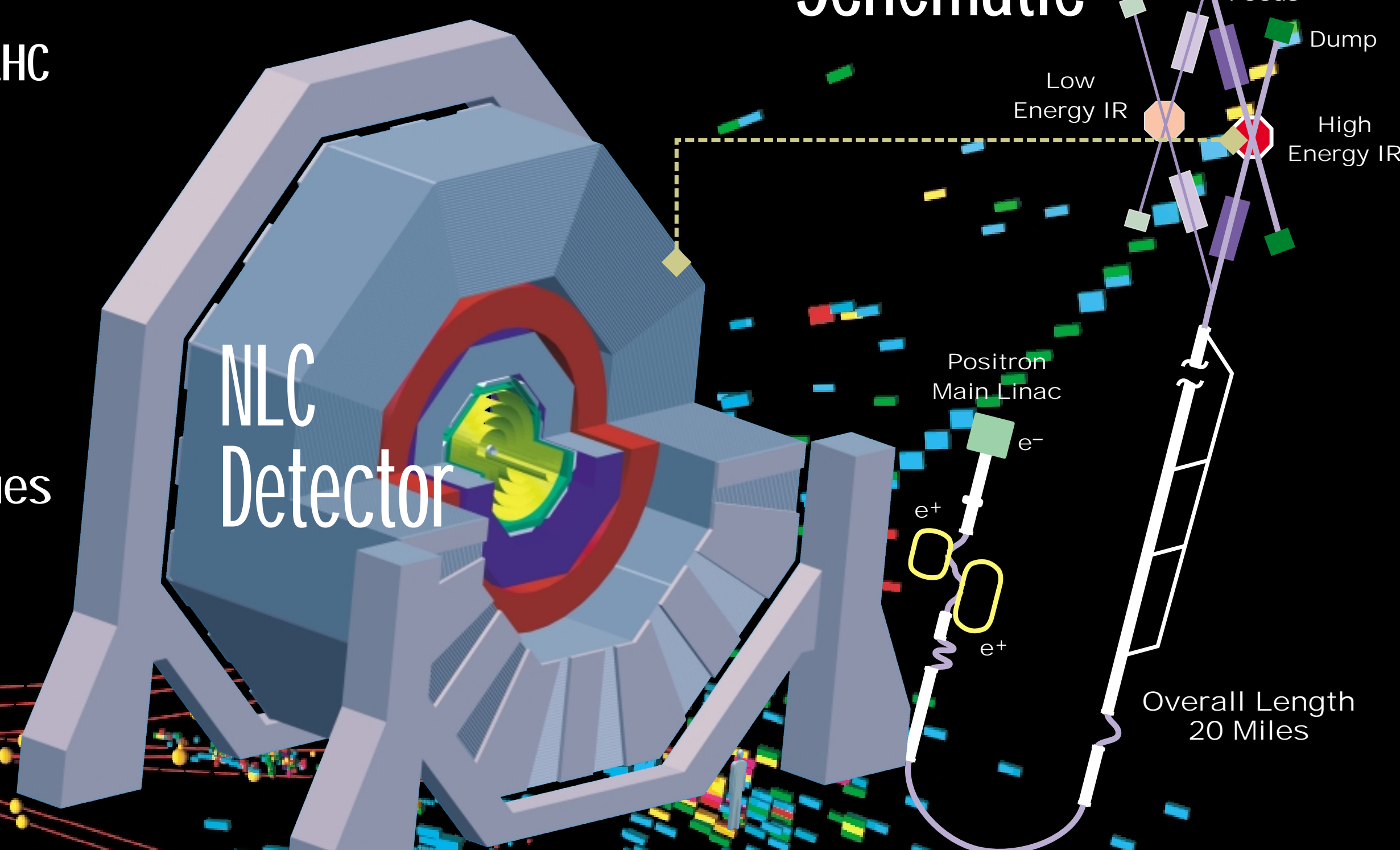




SLAC R&D for the Linear Collider & Detector

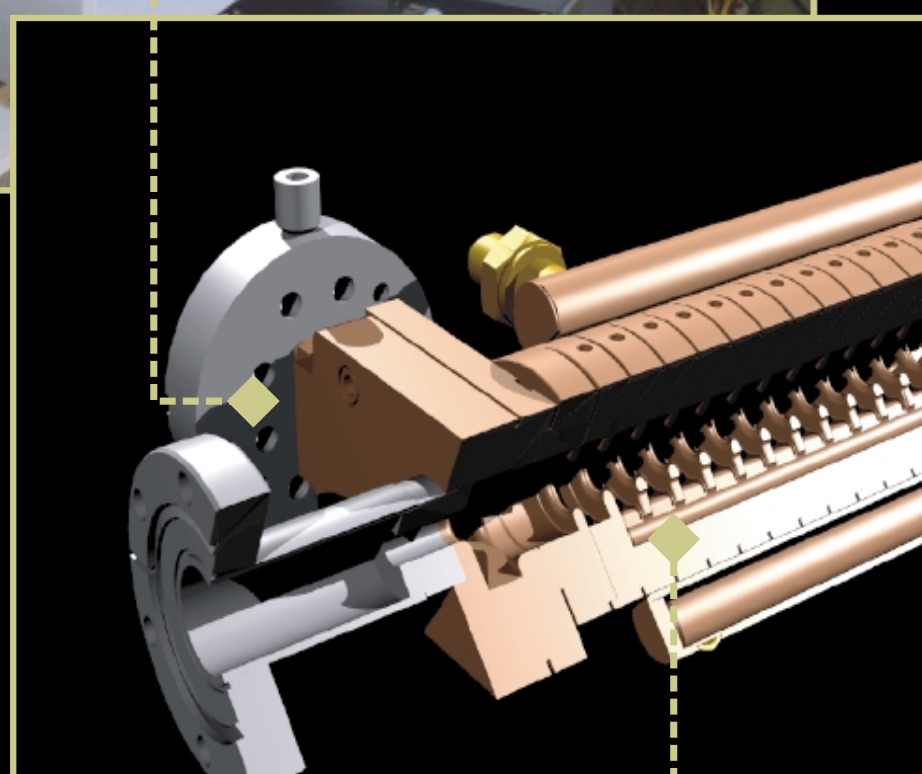
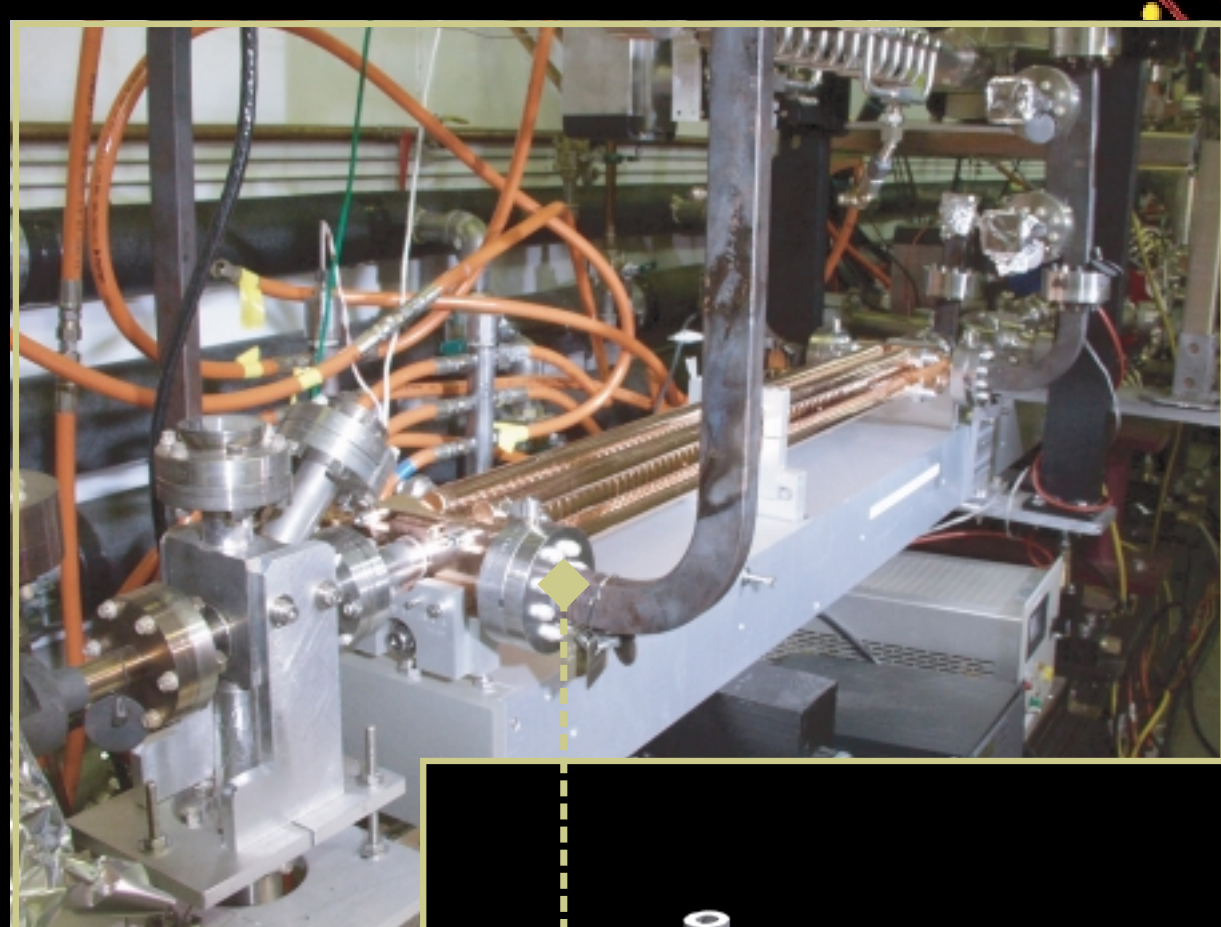
A trillion-electron-volt (TeV) e^+e^- Linear Collider will be a crucial partner to the LHC in the next-generation of particle accelerators, as we seek to unravel dominant mysteries of particle physics and cosmology. SLAC's experience with the pioneering SLC linear collider has expedited development of the technologies and experimental techniques needed to make the next generation feasible. SLAC is a leader in the world-wide implementation of linear collider technology and physics exploitation.

NLC Schematic



NLC Detector

SLAC's Next Linear Collider Test Accelerator



Colliding Beam Parameters

	Stage 1	Stage 2
CMS Energy (GeV)	500	1000 1300
Luminosity (10^{32})	20	30 5
Repetition Rate (Hz)	120	120
Bunch Charge (10^{10})	0.75	0.75
Bunches/RF Pulse	192	192 25
Bunch Separation (ns)	1.4	1.4
Loaded Gradient (MV/m)	50	50
γ_{ex} at IP (10^{-8} mrad)	360	360
γ_{ex} at IP (10^{-8} mrad)	4	4
β_x/β_y at IP (nm)	8	13
σ_x/σ_y at IP (nm)	$\beta \sigma$ 243/3.0	219/2.1
σ_z at IP (um)	110	110
Two Linac Length (km)	13.8	27.6

Components developed for an advanced linear collider are tested in SLAC's Next Linear Collider Test Accelerator. The accelerator is composed of copper disks that surround the electron and positron beams and transfers energy that speeds them to the interaction region within the detectors. The test accelerator has two parts: one shown here to test structures; and a facility to test integrated accelerator-ready components acting as they would in a full-scale accelerator.

Quarks to Cosmos and Back Again

Experiments at Particle Accelerators have found that Matter is made of Quarks and Leptons that interact through the Strong Nuclear Force and the unified Electro-Weak Force. Now observations of the Cosmos reveal that only 5% of the universe is made of particles found at today's accelerators. The rest is mysterious Dark Matter and Dark Energy! The LHC and a Linear Collider are the next generation of particle accelerators poised to explore this new side of Nature. Experiments at the Linear Collider will resolve details of the physics of the Universe when it was less than a nanosecond old, and will search for Dark Matter and clues to the Dark Energy.

