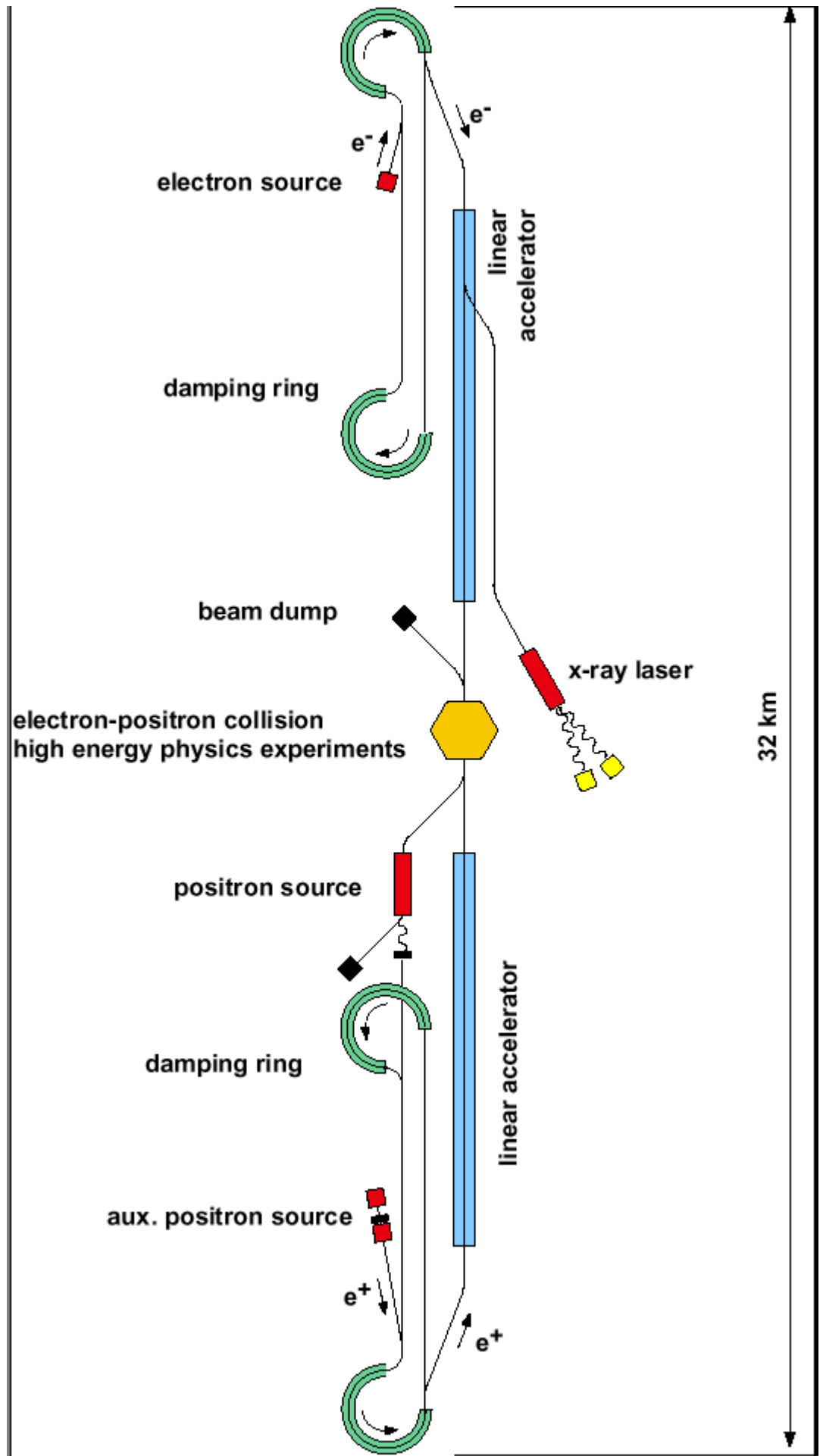


The TESLA Layout



TESLA parameters

| | TESLA-500 |
|---|---|
| Accelerating gradient | E_{acc} [MV/m] 23.4 |
| RF-frequency | f_{RF} [GHz] 1.3 |
| Fill factor | 0.747 |
| Total site length | L_{tot} [km] 33 |
| Active length | 21.8 |
| No. of accelerator structures | 21024 |
| No. of klystrons | 584 |
| Klystron peak power | [MW] 9.5 |
| Repetition rate | f_{rep} [Hz] 5 |
| Beam pulse length | T_P [μ s] 950 |
| RF-pulse length | T_{RF} [μ s] 1370 |
| No. of bunches per pulse | n_b 2820 |
| Bunch spacing | Δt_b [ns] 337 |
| Charge per bunch | N_e [10^{10}] 2 |
| Emittance at IP | $\gamma\epsilon_{x,y}$ [10^{-6} m] 10, 0.03 |
| Beta at IP | $\beta_{x,y}^*$ [mm] 15, 0.4 |
| Beam size at IP | $\sigma_{x,y}^*$ [nm] 553, 5 |
| Bunch length at IP | σ_z [mm] 0.3 |
| Beamstrahlung | δ_E [%] 3.2 |
| Luminosity | L_{e+e-} [10^{34} cm $^{-2}$ s $^{-1}$] 3.4 |
| Power per beam | $P_b/2$ [MW] 11.3 |
| Two-linac primary electric power (main linac RF and cryogenic systems) | P_{AC} [MW] 97 |

A Nine Cell Niobium Cavity



Clean Room Assembly of TESLA cavities for a module



The TESLA Test Facility



Tests of TESLA Cavities

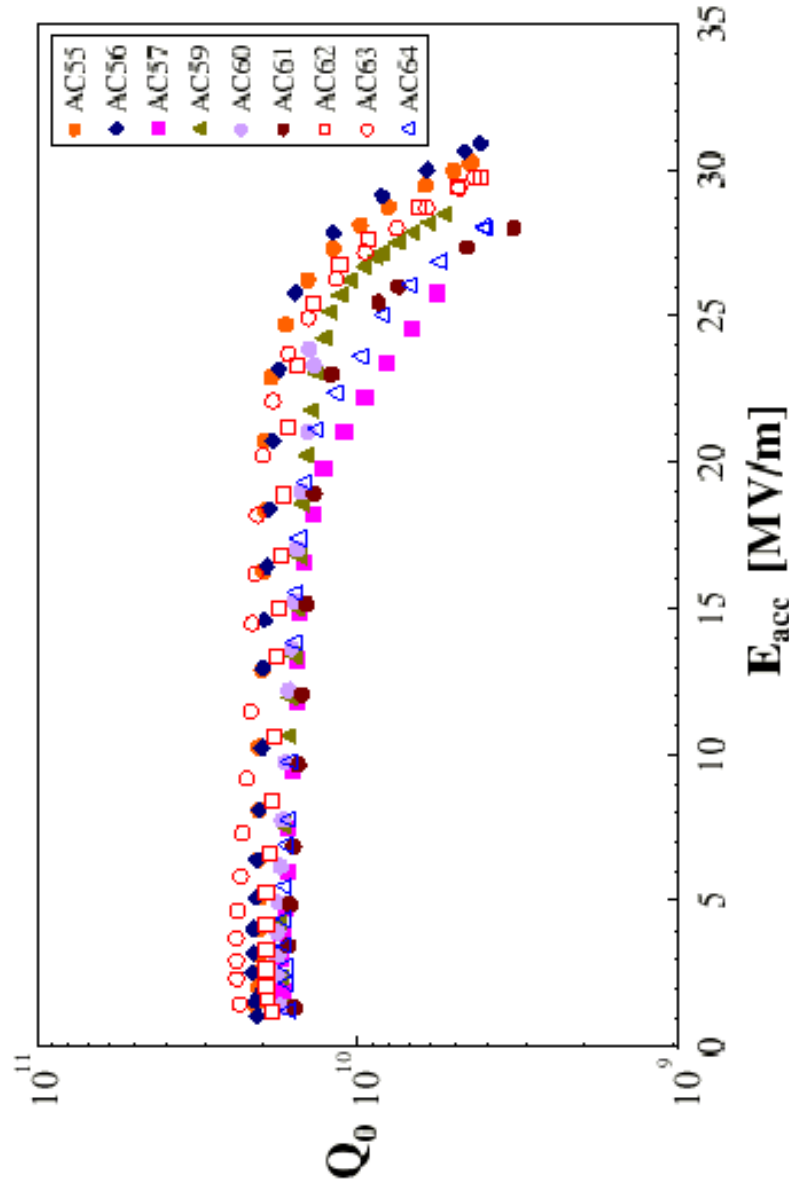
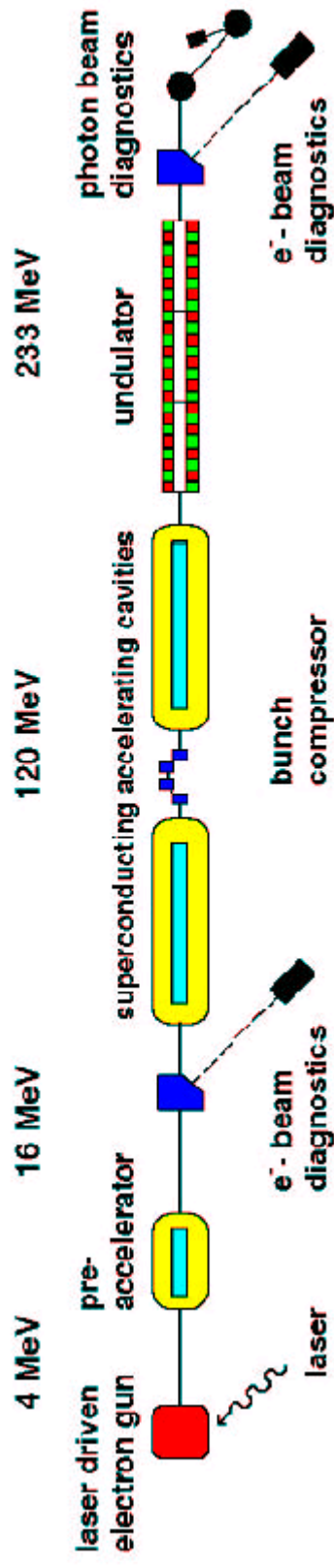
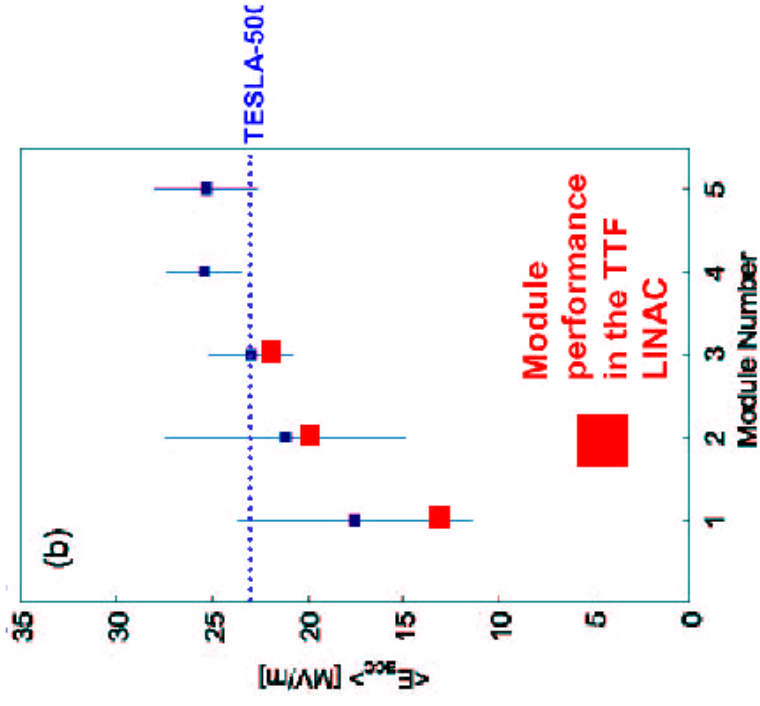
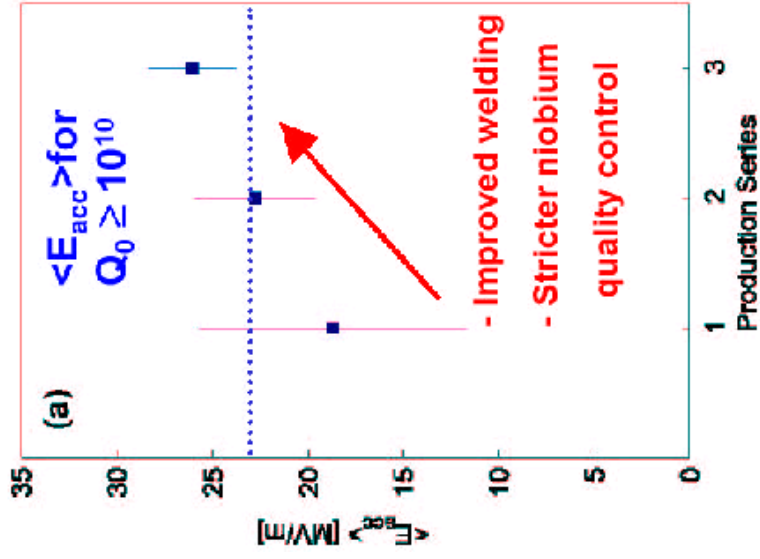


Figure 2.1.10: Excitation curves of cavities of the third production series.

The TESLA Multi-Beam klystron (Thompson)

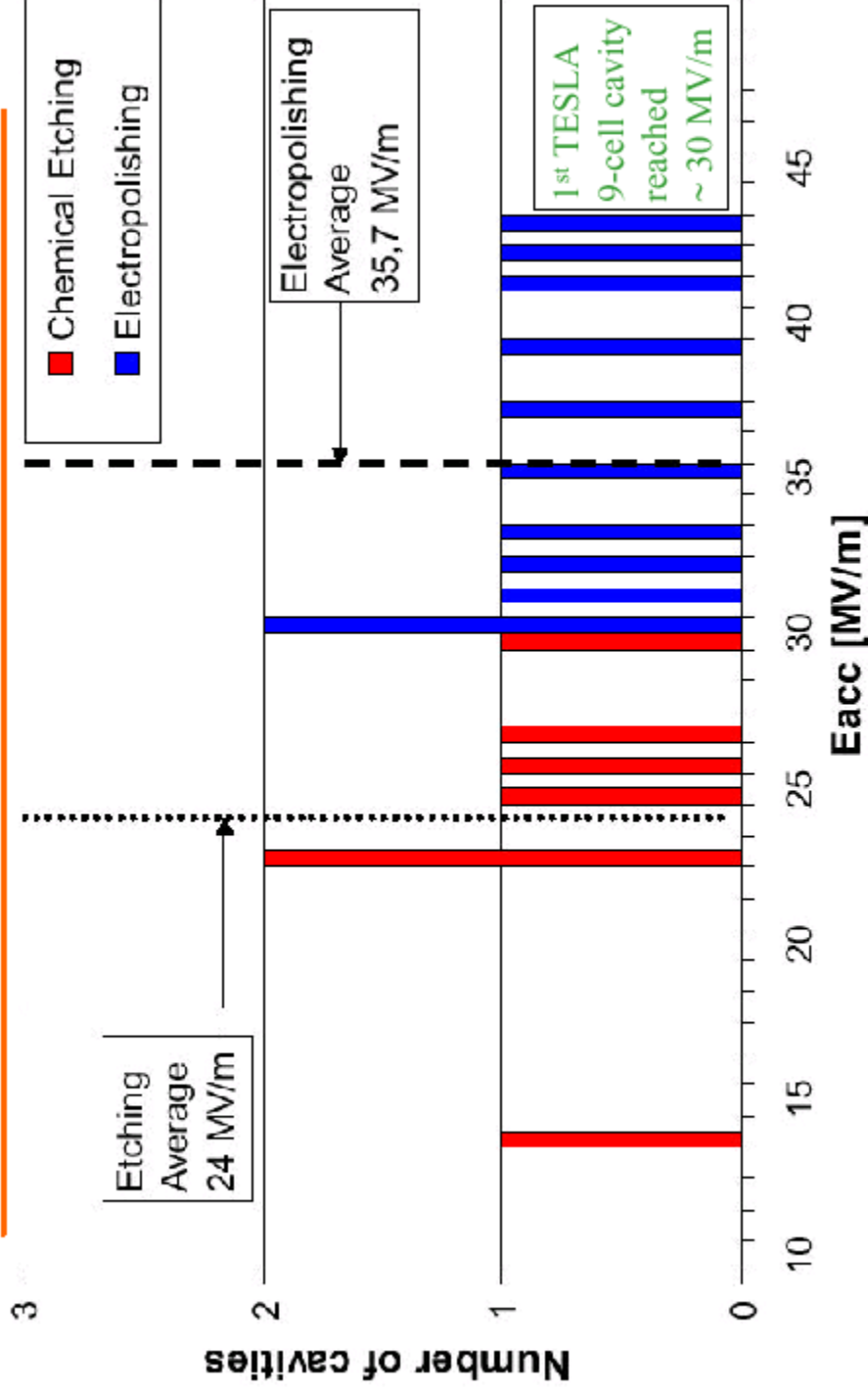


Gradient Performance



Efforts to increase the gradient

Electropolishing versus Etching



TESLA Status and Plans

- 7000 hours at ~ 1 Hz with two 8-cavity modules
- Delivering beam for SASE FEL (17 MV/m)
- Some dedicated TESLA –like operation
- Gradients up to 23 MV/m (TESLA-500 goal) with a single module.
- Build 2 more 8-cavity cryo-modules for TTF-2
- TTF-2 to be commissioned in 2003.
- Build one 12 cavity TDR-style module ~ 2004
- The 800 GeV upgrade would use 35 MV/m.