LCC ILC cavity group 2nd meeting

A. Rowe, A. Grassellino
Fermilab

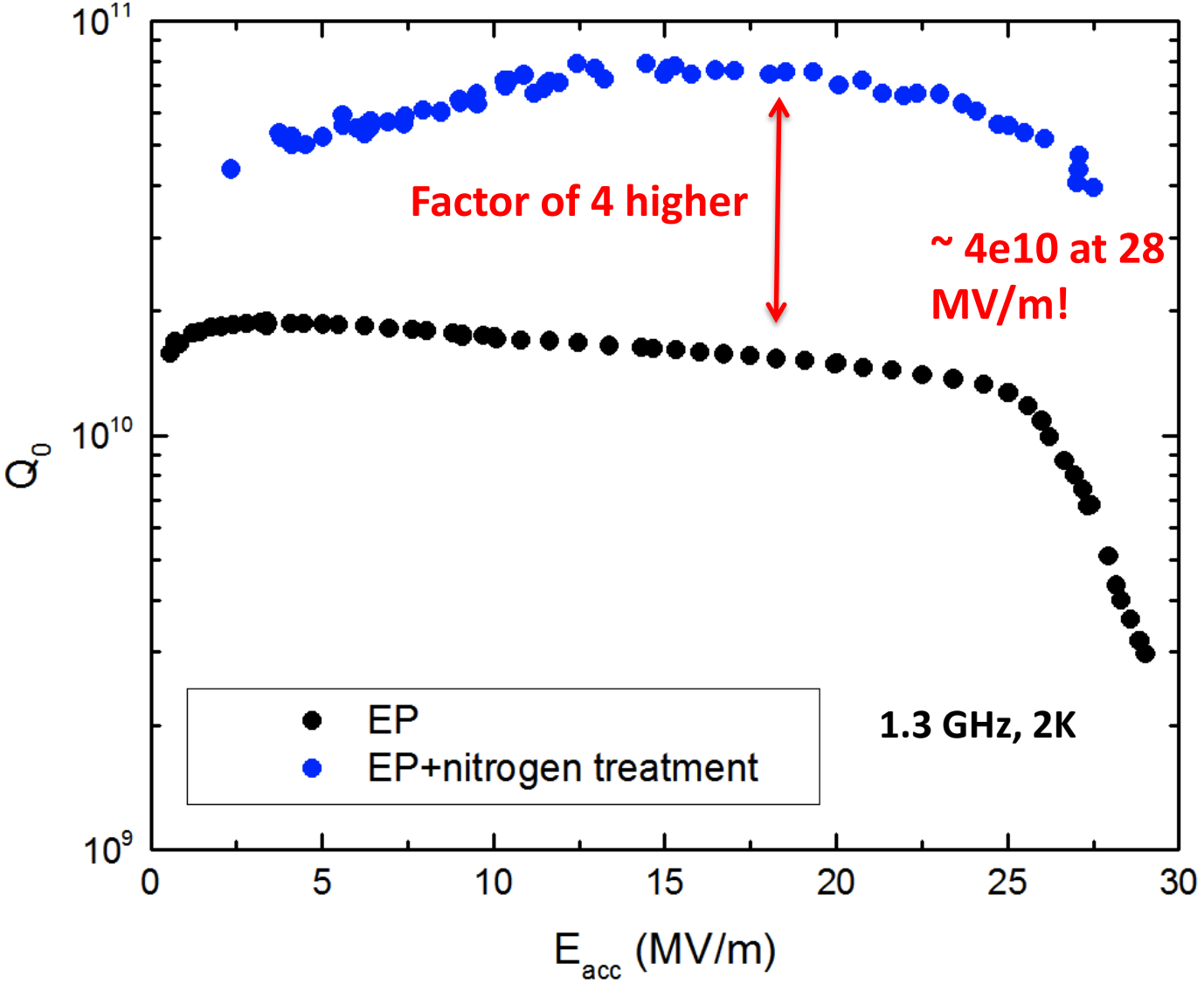
Summary of FNAL SRF activities

- Large amount of R&D in several directions:
  - High Q for for Project X, other CW machines and at higher gradients (1.3GHz and 650 MHz)
    - *Development of new processing techniques*: eg controlled doping of surface with nitrogen or argon paves the way to alternative processing baseline for mid field CW and even higher gradients machines
    - *Understanding of flux trapping during cooldown (single and nine cell)*
  - Surface processing sequence optimization (1.3 GHz)
    - Chemistry free CBP, Faradaic EP, Elimination of post-anneal/degassing chemistry
  - Alternative materials and multilayers in collaboration with ANL (ALD)
  - Other activities: Spoke cavities (325 MHz) for PX, 650 MHz cavities for PX…

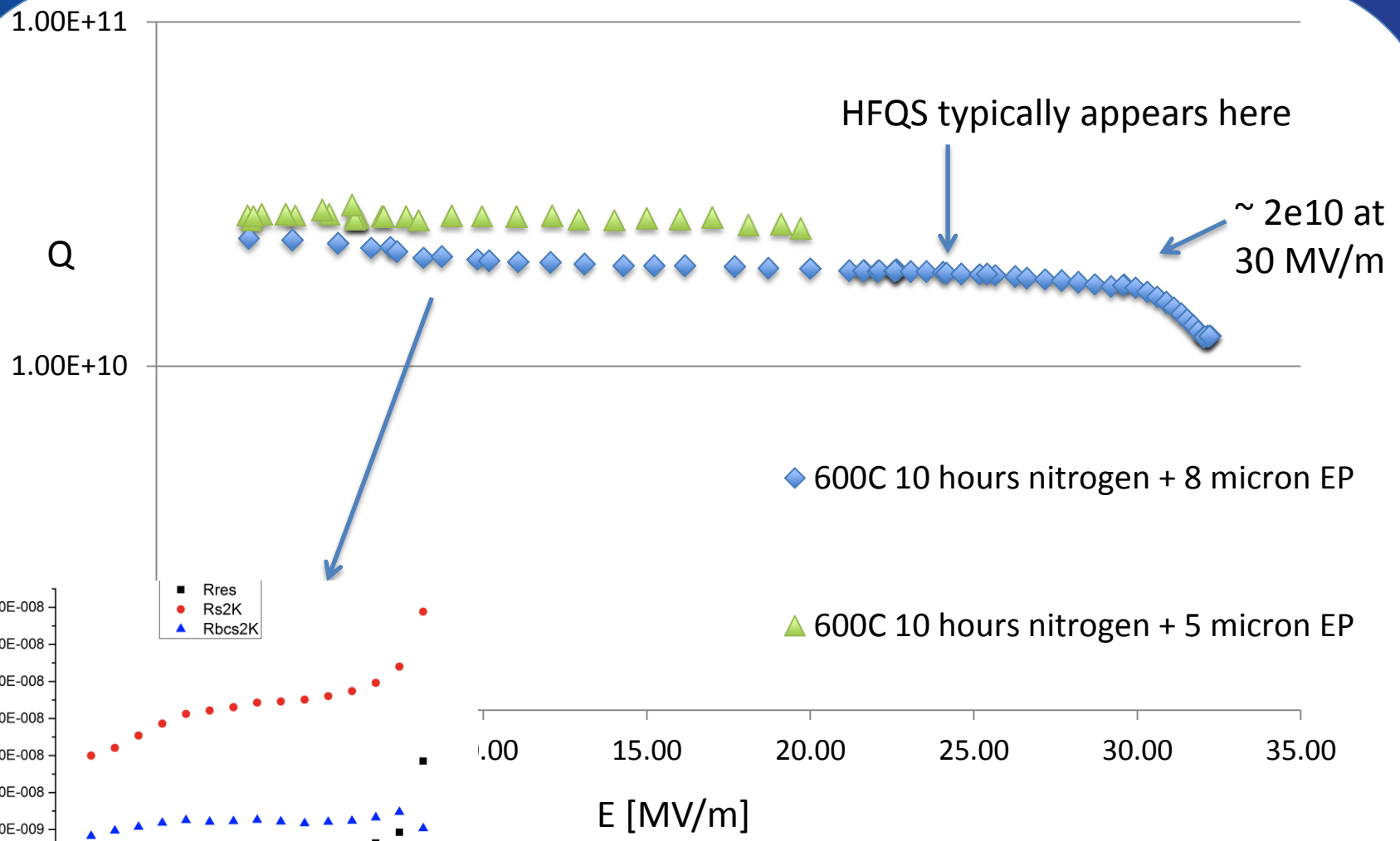
Important milestones for ILC

- Nitrogen doping can produce higher Q at high fields
- HFQS can be eliminated by N doping, 120C is no longer the only processing recipe to remove HFQS
- Demonstrated repeatedly on > 10 FG cavities that high T baking with protective Nb caps removes the need of post –anneal chemistry (processing simplification and improved performance)
- Chemistry free CBP can produce cavities with decent Q up to 35 MVm (Q ~ 1e10 at 20MV/m, 2K and in the low 1e9 at 35 MV/m)
- Faradaic EP can produce good performing cavities (meeting ILC specs)

Nitrogen Doping – doping the surface with interstitial nitrogen produces high Q up to higher fields

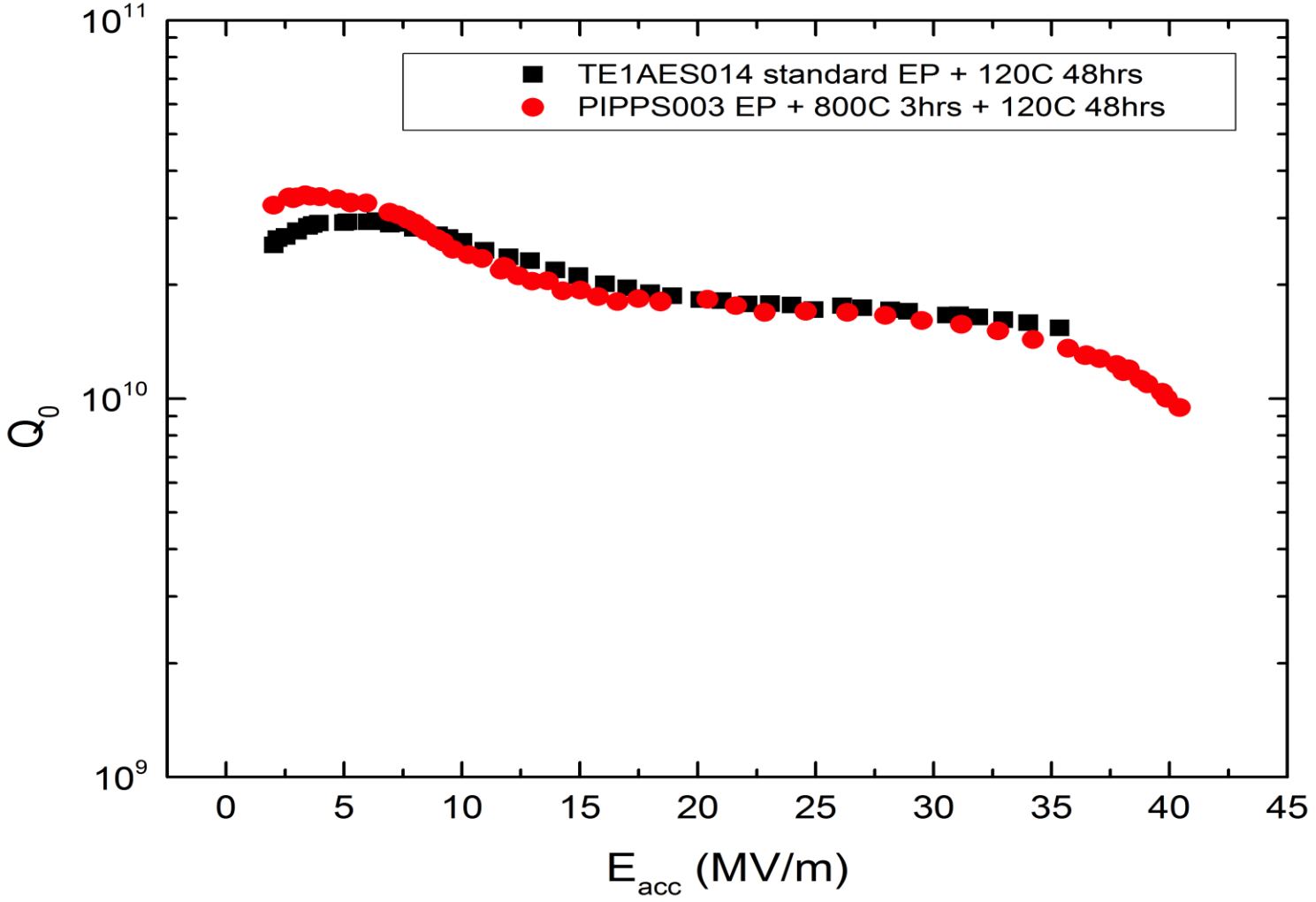


No HFQS in unbaked cavities – N doping and higher Q at high fields

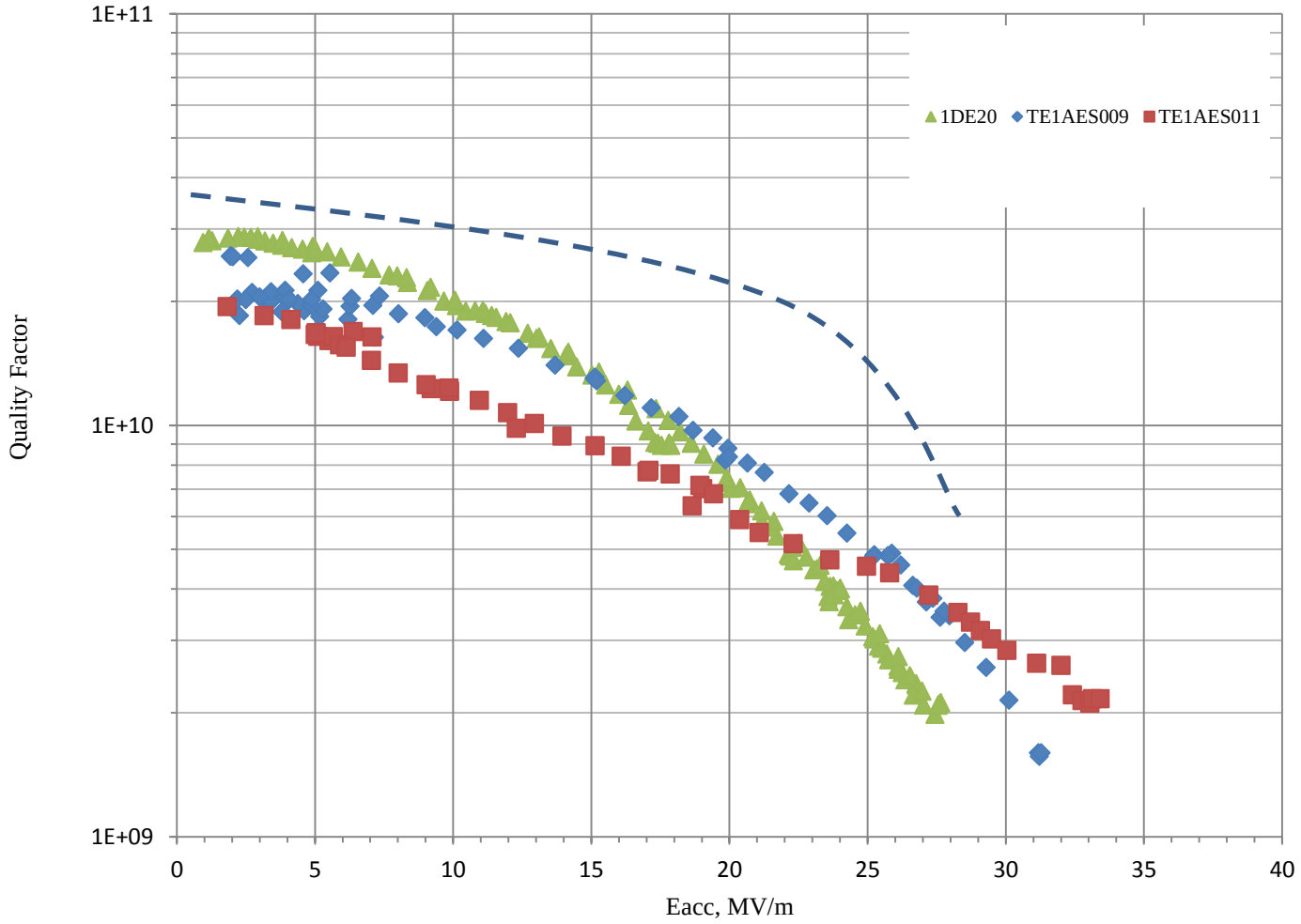


Promise for higher Q up to the highest fields

Anneal followed by no chemistry meets repeatedly ILC specs



Chemistry free CBP



TE1AES012 Performance Results
Vertical Bipolar EP Light Polishing High Performance Test