

ILC – Electropolish Development (EP) Plans/Progress/Problems/Performance

Jefferson Lab

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ILC – Electropolish Development (EP) Plans

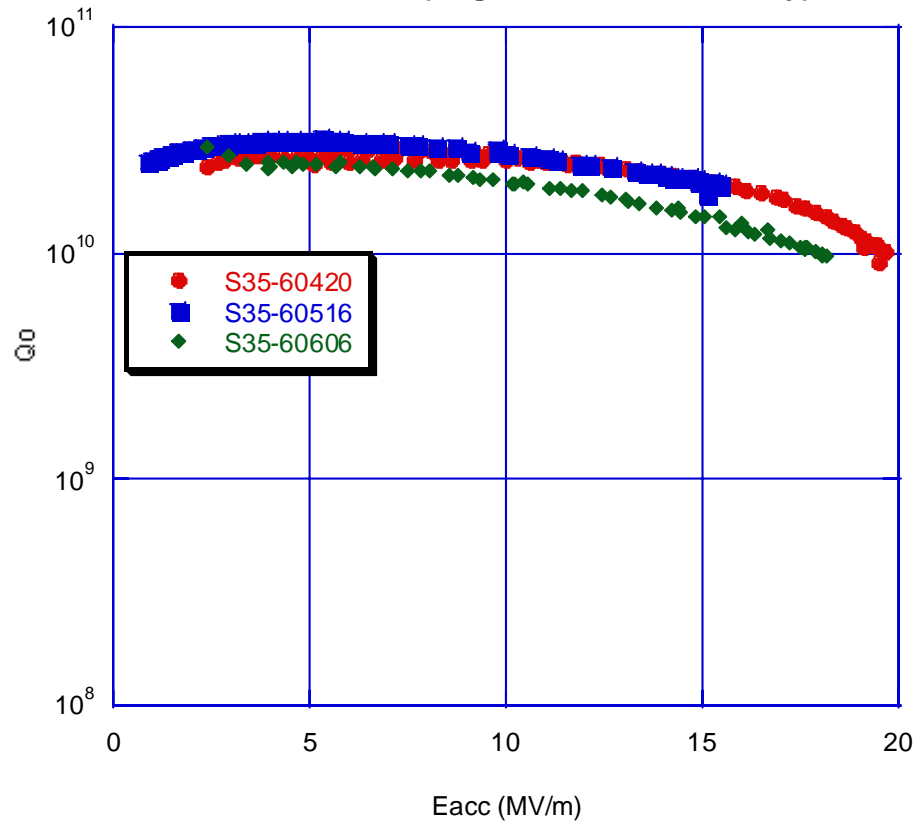
Goals for EP Development (Parallel Efforts)

1. Determine the RF performance spread from standard process procedures on a spare 9-cell cavity (S35) without chemistry
 - Document baseline procedures
 - Aim is procedures that are reproducible with little or no field emission
 - Perform HPR, assembly and testing with S35 cavity to analyze procedure effectiveness
 - Record process data in Jlab database
 - Analyze and document results

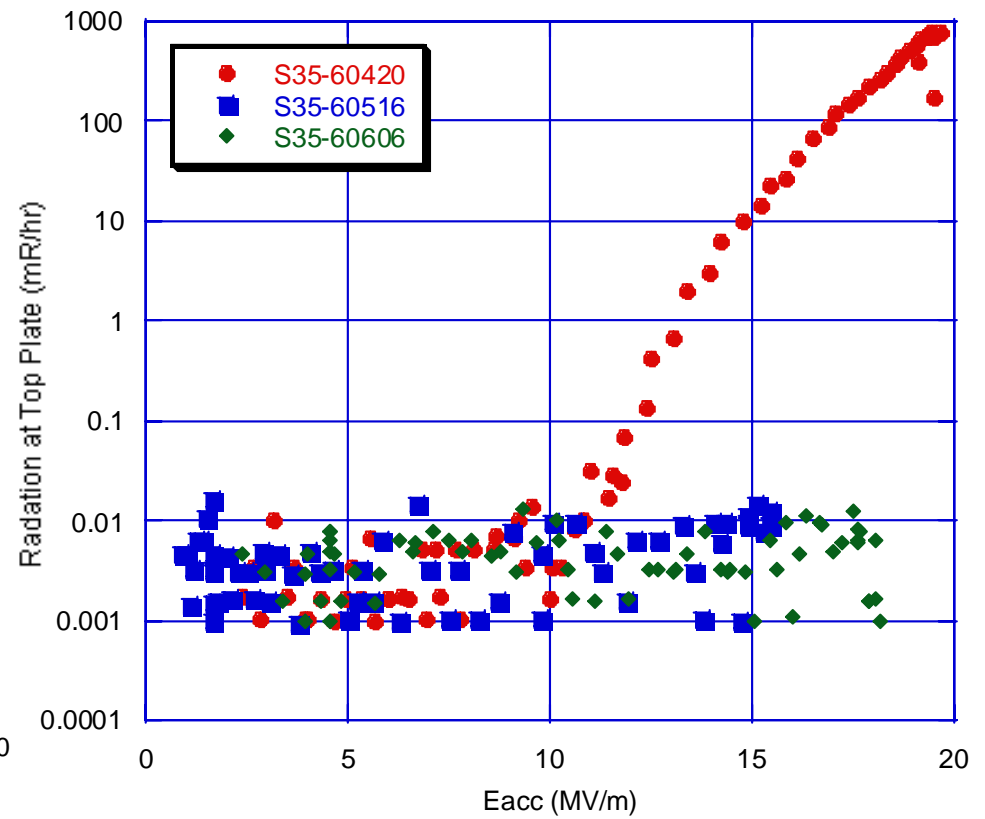
Status: RF cavity assembly and testing

- Four cavity test cycles completed so far
 - Limitation of test rate is available labor
 - All tests reached repeatable quench
 - Last three no field emission but quenching at different gradients
- Many assembly and processing improvements Identified
 - Assembly tooling to reduce handling
 - Cavity drying after HPR would be a big improvement
 - Alignment frame mods for assembly from below
- Part cleaning, assembly and HP rinsing going well

S35 9-cell Tests (Degrease,HPR, Assembly)



Radiation During S35 RF Tests



July 5th, 2006

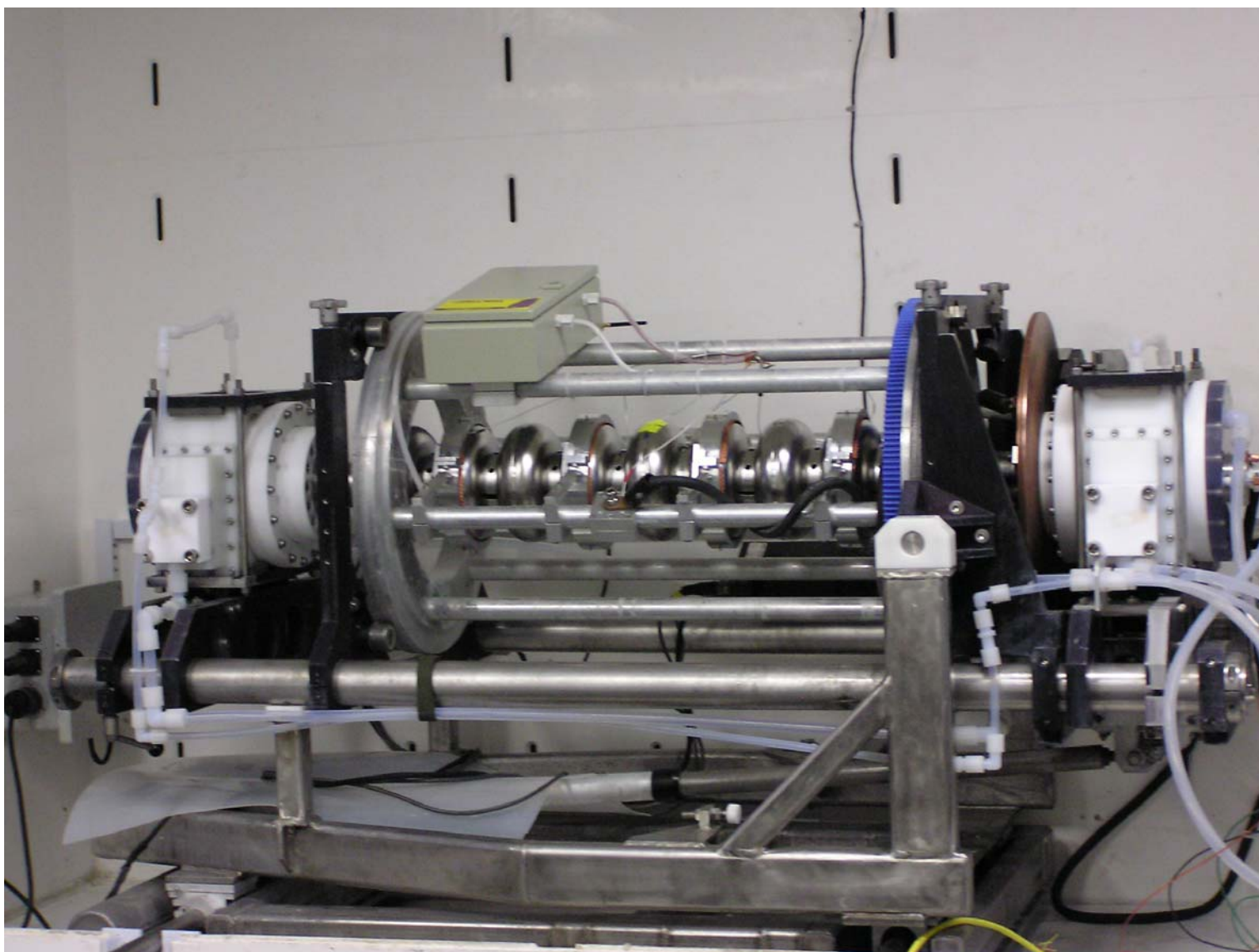
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Goals for EP Development Plans cont.

2. Establish EP processing for ILC 9-cell cavities at Jlab
 - Commissioning EP cabinet with Spare DESY 9-cell cavity
 - Investigate standard process procedures to gain a better understanding of current issues (Sulfur precipitation, HF loss during use)
 - Map out process parameter space (flow, rotation and temperature)
 - Identify and develop relevant process metrics and QA steps
 - Establish and document procedures
 - Aim is uniform reproducible etching with clean surfaces after rinsing
 - Process, test, qualify and prep cavities for FNAL string assembly

Status: EP processing of cavities

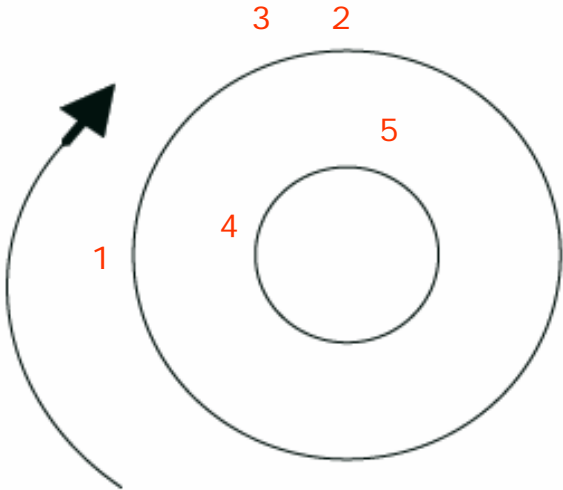
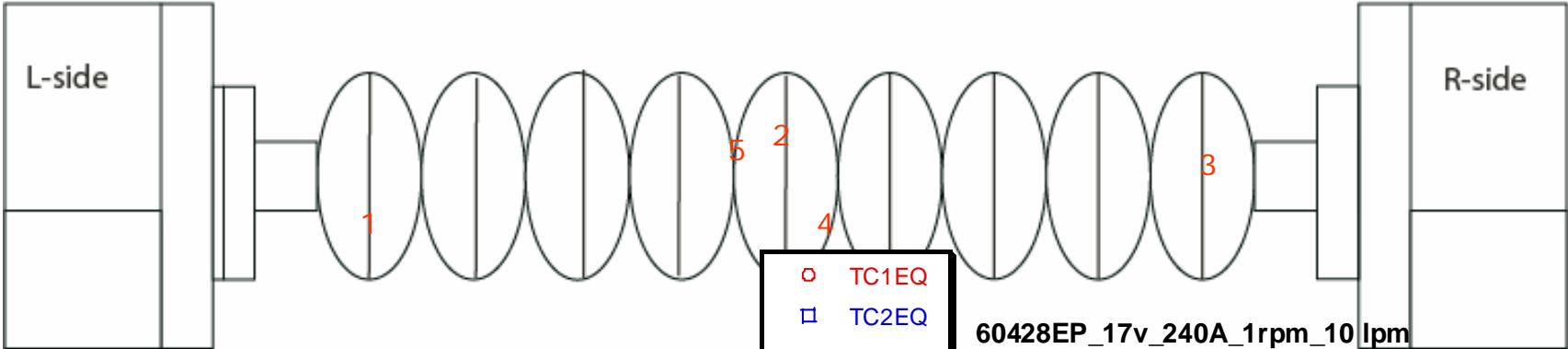
- Process cabinet working well
- Data collected on
 - Acid flow rate
 - Rotation speed
 - Variations in anode contacts
- S35- will be electropolished today tested next week
- A7 – Mechanical inspection then tuning



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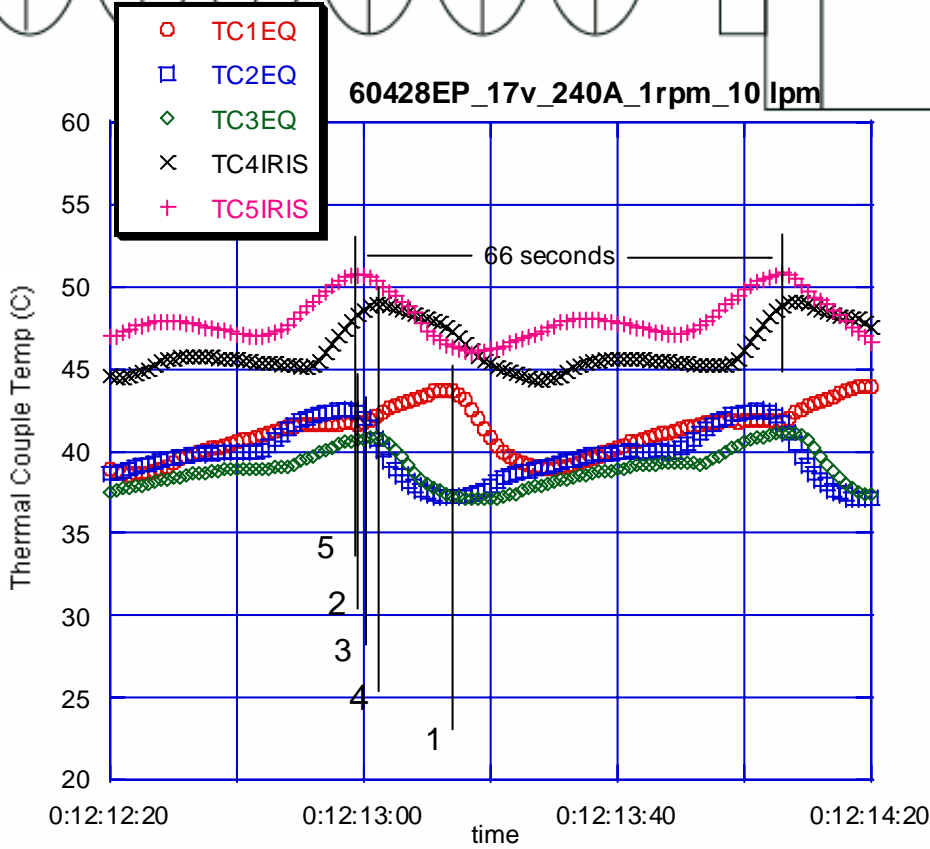
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ELECTROPOLISH 9-CELL-SETUP



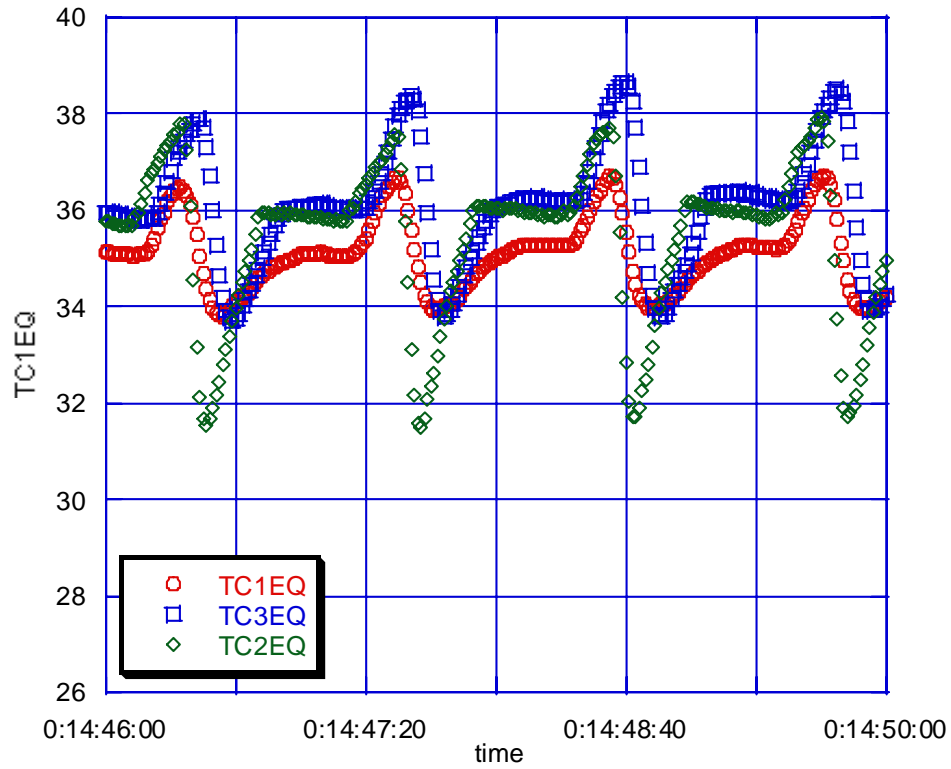
R-SIDE VIEW

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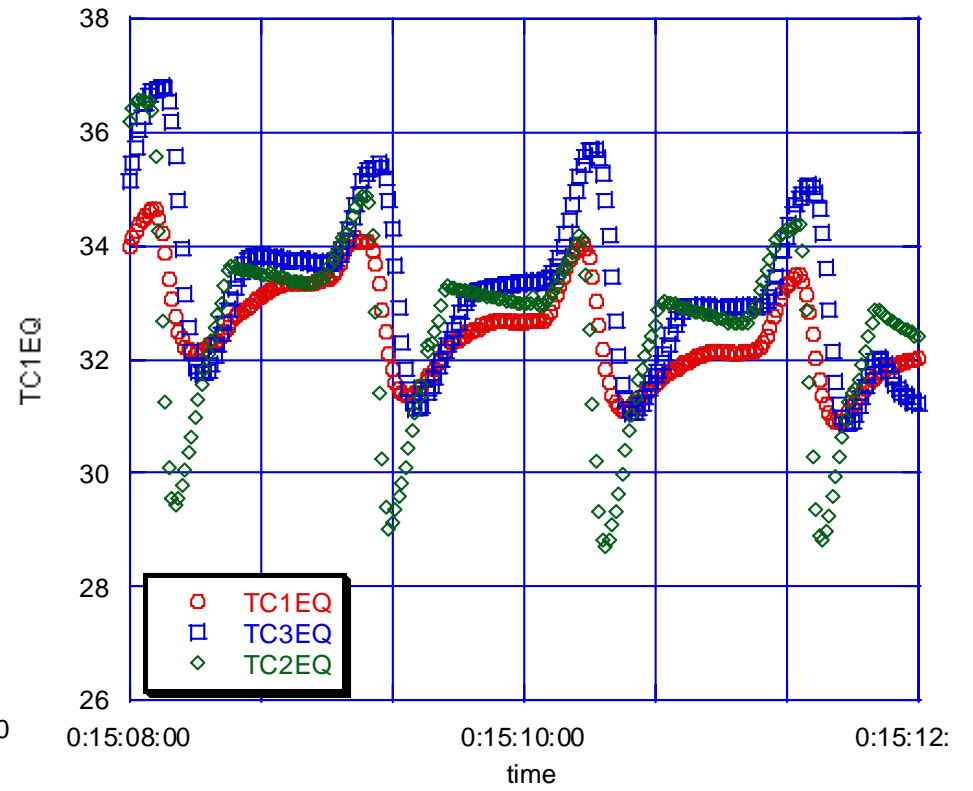


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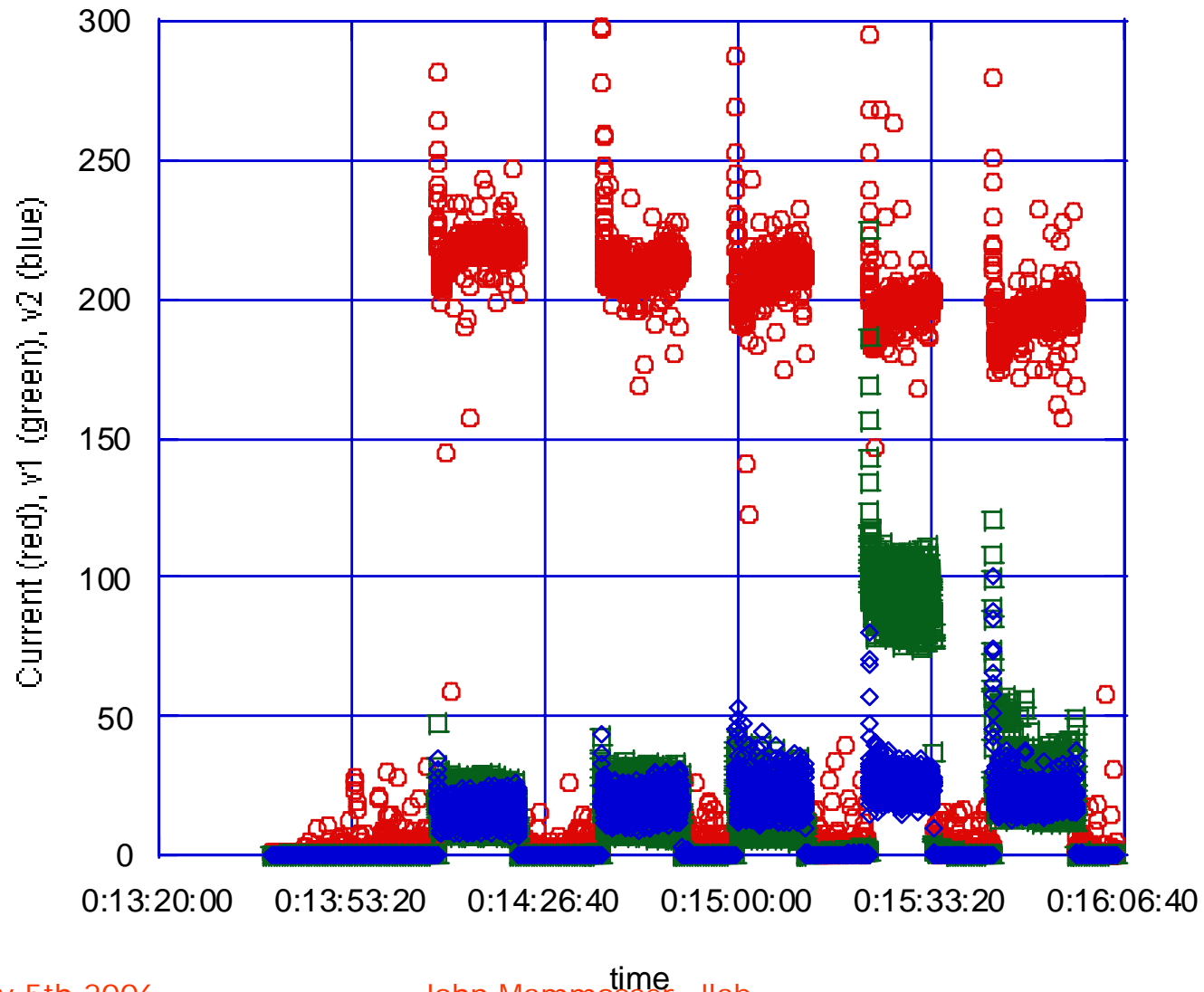
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Run3



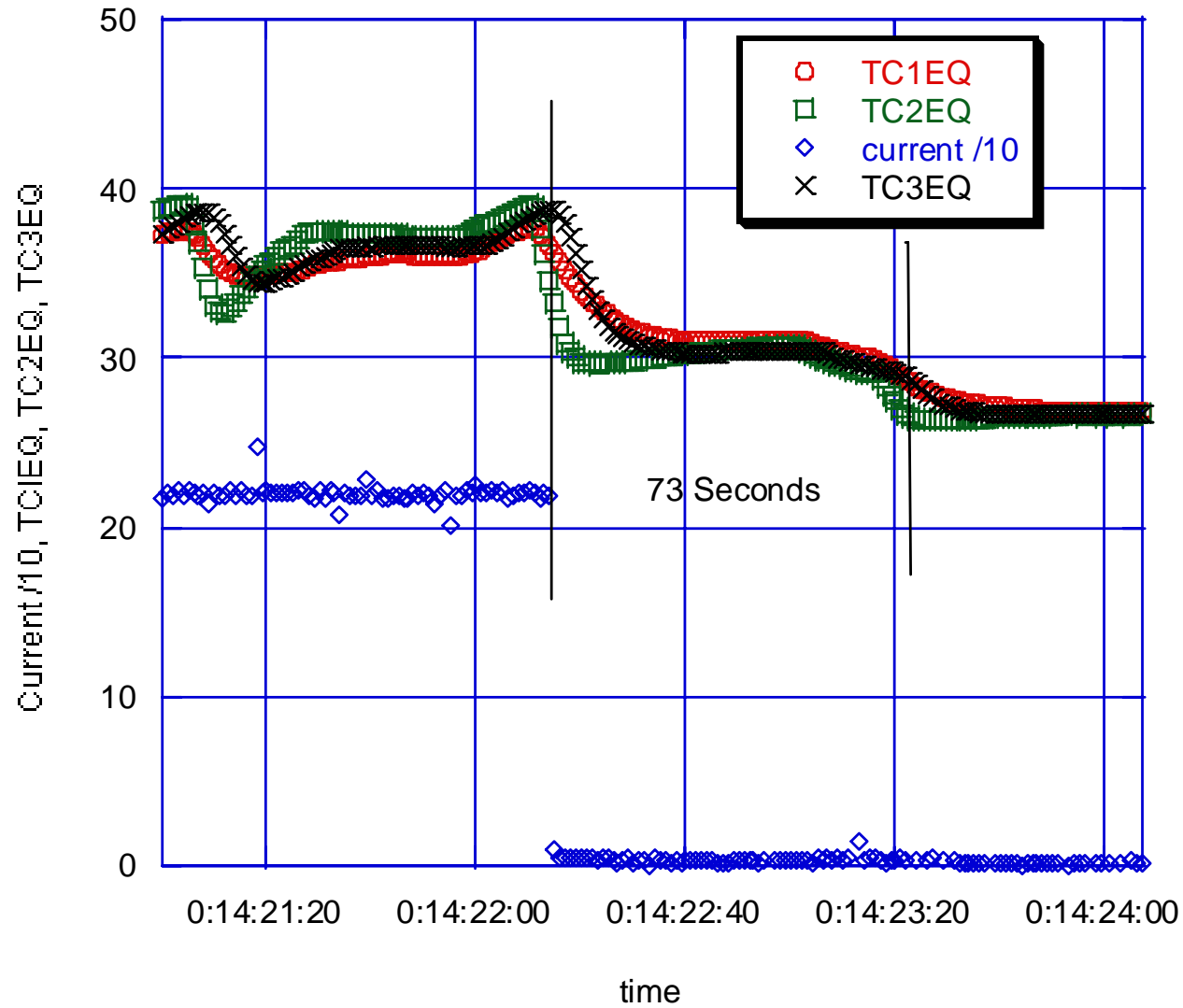
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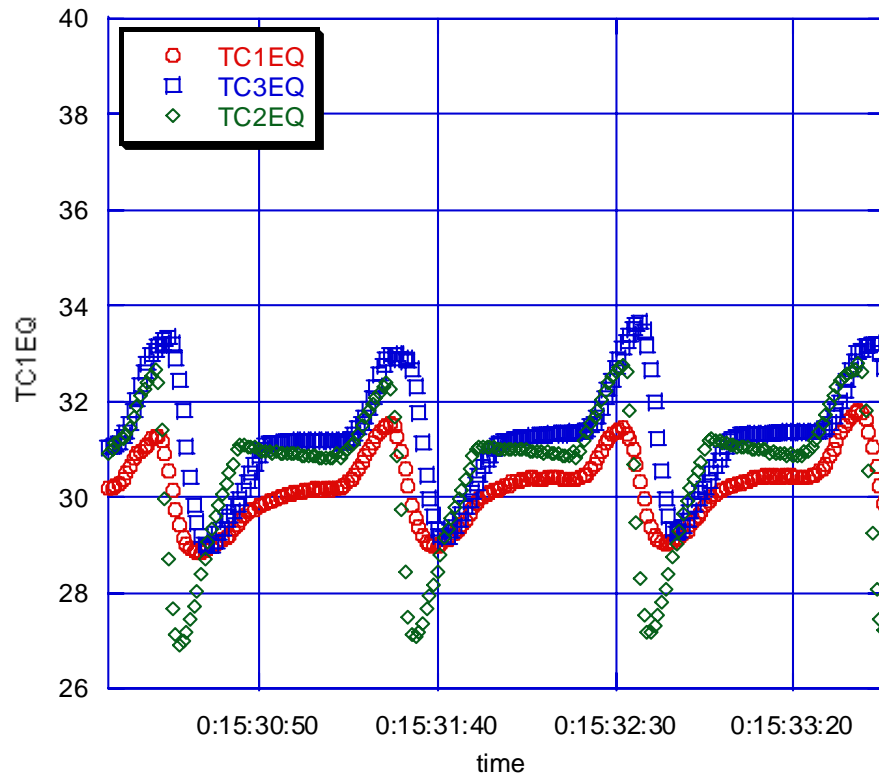
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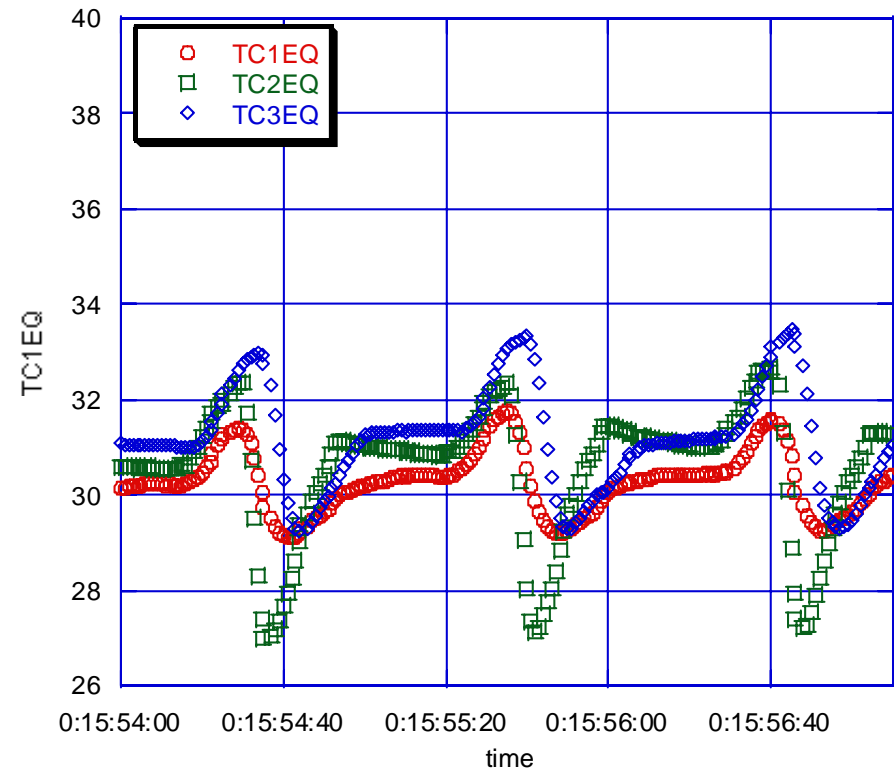
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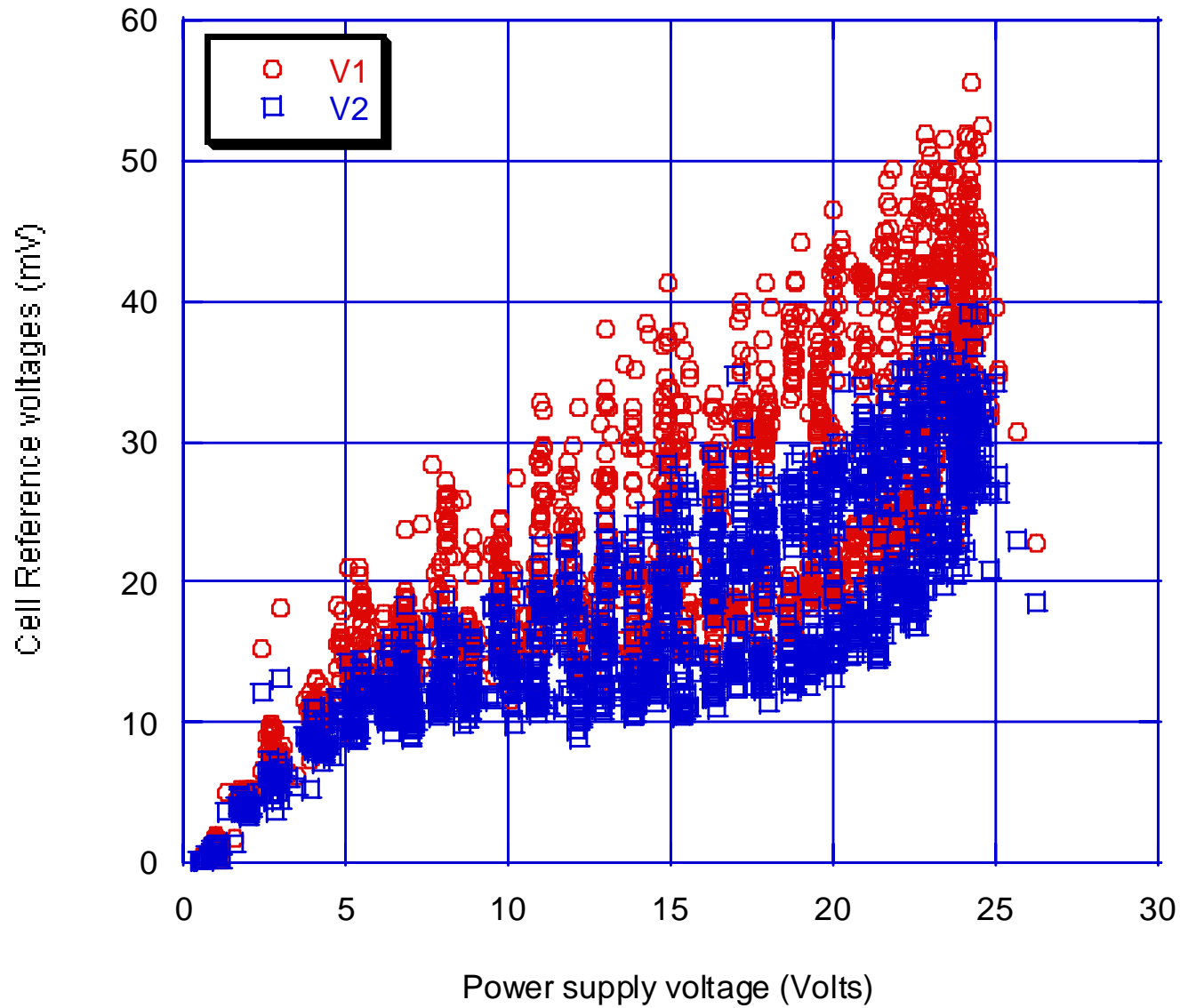
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run5



042406EP



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Goals for EP Development Plans cont.

3. Supporting efforts for EP development
 - Perform various bench top experiments aimed at answering questions and building knowledge
 - Perform EP processing and testing on 1.3 GHz single cell cavities to support process development and ILC R&D goals
 - Q-disease
 - Surface contamination and removal
 - Effective rinsing
 - Develop better understanding of chemistry
 - EP affects on niobium surface chemistry
 - Develop Thermal model of chemistry

Status: Supporting efforts for better understanding

- Single cell setup (work stopped)
 - Wet bench here
 - Rotary sleeves tested
 - Chemical sump here
 - Heat exchanger fabricated
 - Alignment tooling almost complete
- Chemistry understanding
 - Corcoran (virginia tech)– determining all possible reactions, looking at thermal data from runs to understand what is happening
 - Captured video of oscillations on test sample

Issues:

- I need to determine what I can complete with the funds left
 - The focus will be on the following:
 - Few EP runs on S35 to identify reproducibility
 - Preparing A7 for electropolish
 - Improving assembly techniques (video tape with particle counter)
 - Identifying best assembly methods
 - Improving assembly tooling as we go
 - Drying of cavities after HPR investigated looks promising