9mA meeting, 17th July 2012

Klystron saturation studies planning

Update on studies dates for Sept

- **~15 shifts are expected**
- **Studies are confirmed for KW38 (week of Sept 17th)**
- **Exact dates within KW38 are not yet determined (when..?)**

‘Missing Measurements’: studies program for Sept 9mA shifts

- **Context**
  - ILC Global Design Effort formally coming the end
  - Technical Design Report is being written
  - Sept 9mA studies will be the last before formal completion of the ILC Global Design Effort

  - *The most important ILC studies – shows that an ILC can be built and actually work*

- **What should we try to accomplish in Sept…?**

Pushing the parameters beyond what we already have achieved (*A yet stronger demo*)

- **We're not quite there with the demo that we can operate within ILC gradient margins**
  - Gradient margins themselves
  - Running at the ILC current (now 5.8mA)
  - Definitely want to spend some time understanding how to use the soft limiters wrt quench limits
  - Can we dynamically recover from marginally starting to quench

- **We also not quite there demonstrating operation with minimal klystron power overhead**
  - Few datapoints so far

- **What about any tests related to Klystron Cluster Scheme..?**

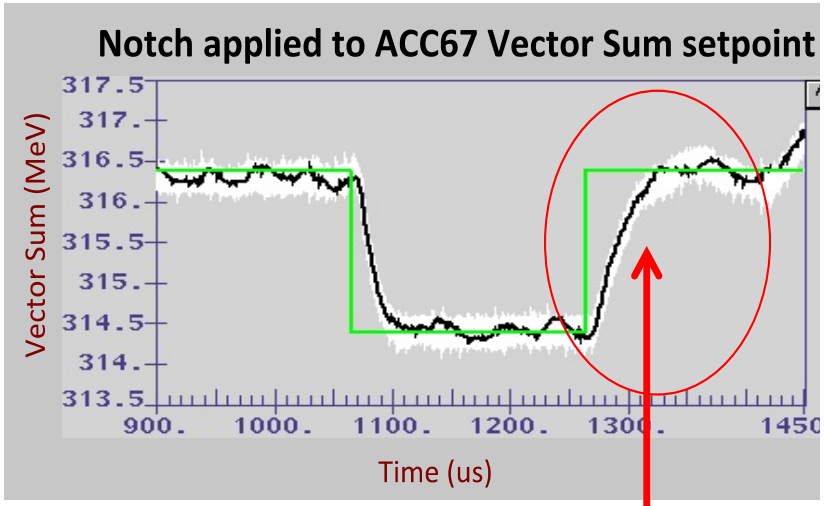
Characterization context

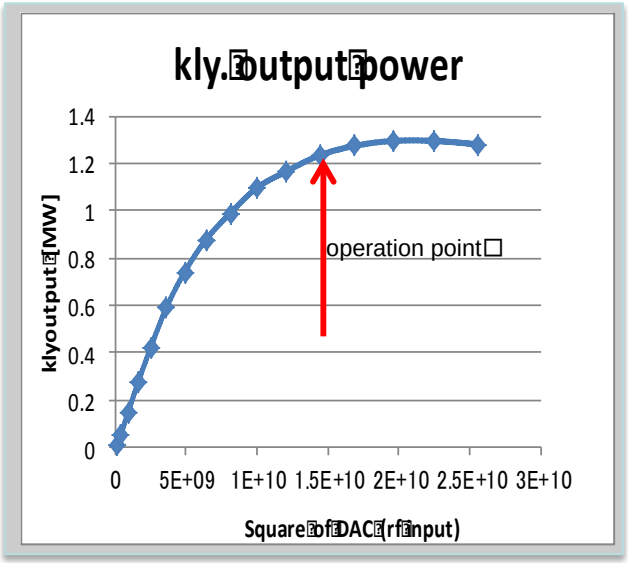
- **What can we do now that we'd want to include in the 9mA journal article(s)…?**

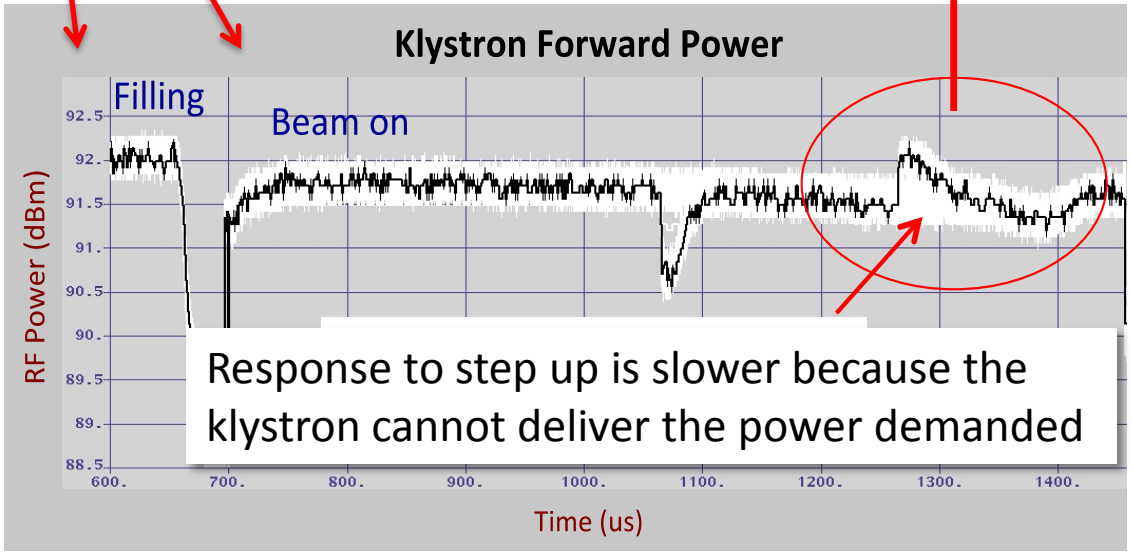
- **(My view) – we would want to show an understanding of the issues and limitations**
  - Characterize operation close to gradient margins
  - Characterize operation close to power limits

Evaluating rf power overhead requirements (4.5mA/800us bunch trains)

- Klystron high voltage was reduced from 108KV to 86.5KV so that the rf output just saturated during the fill
- The required beam-on power ended up being ~7% below saturation







Response to step up is slower because the klystron cannot deliver the power demanded

How to characterize operation close to klystron saturation…?

- ***Questions (still) to be answered***
  - *How does stability change as we get closer to klystron saturation*
  - *Is there a knee or a hard threshold on how close we can run?*
  - *How much benefit do we get from klystron linearization?*

- **Conditions**
  - Beam-on power as high as possible (above the fill power)
  - Run klystron down till we can no longer reach the VS setpoint with the beam power
  - Use Klystron linearization function in LLRF controller?