

# Study plan for HLRF/LLRF and DRFS in S1-Global

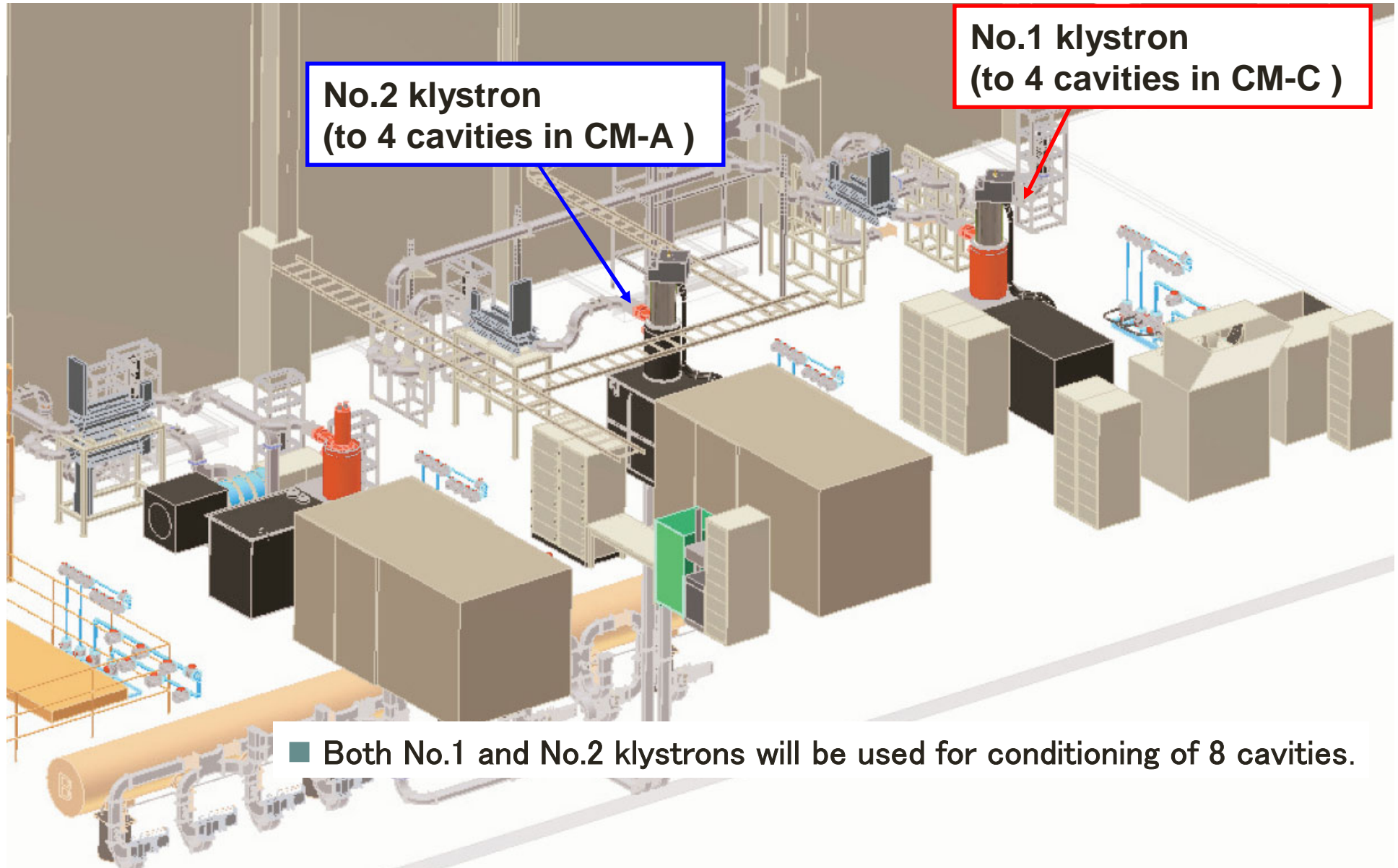
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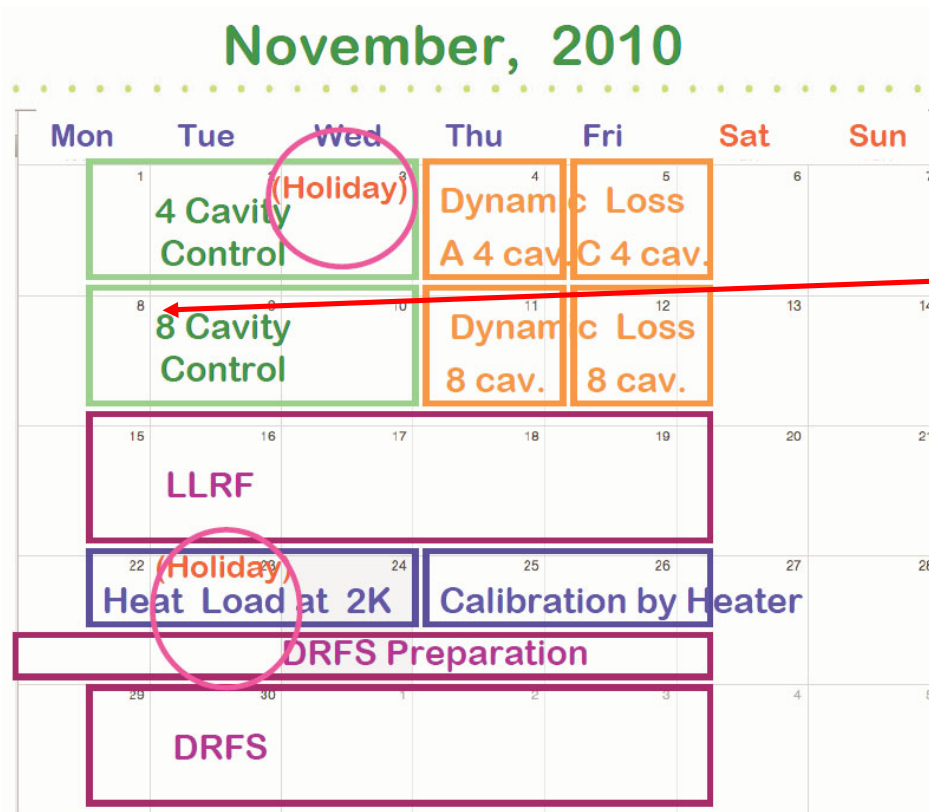
**S. Fukuda, “S1-Global RF Preparation”**

**S. Michizono, “S1-Global study plan (HLRF/LLRF) ”**

# RF system for cavity processing in S1-Global



# S1-G schedule for LLRF/HLRF study



Until 6<sup>th</sup> November, two klystrons are operated for cavity processing.

- Replacement of waveguide system for one klystron operation and calibration (on 8<sup>th</sup> November)  
→ No.2 klystron feeds its power to 8 cavities.

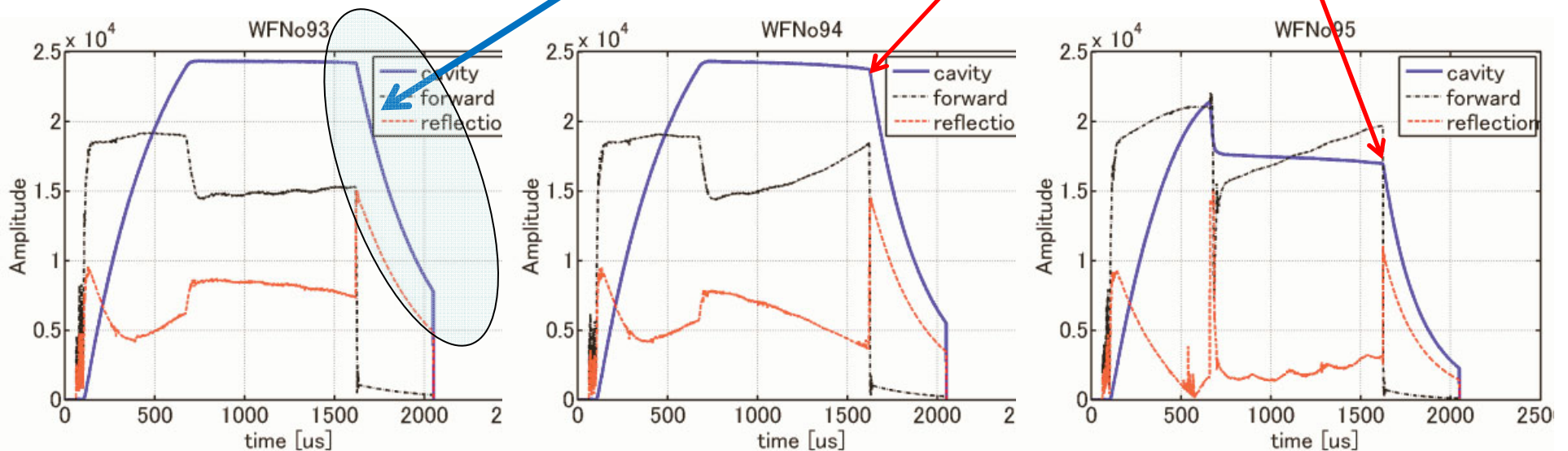
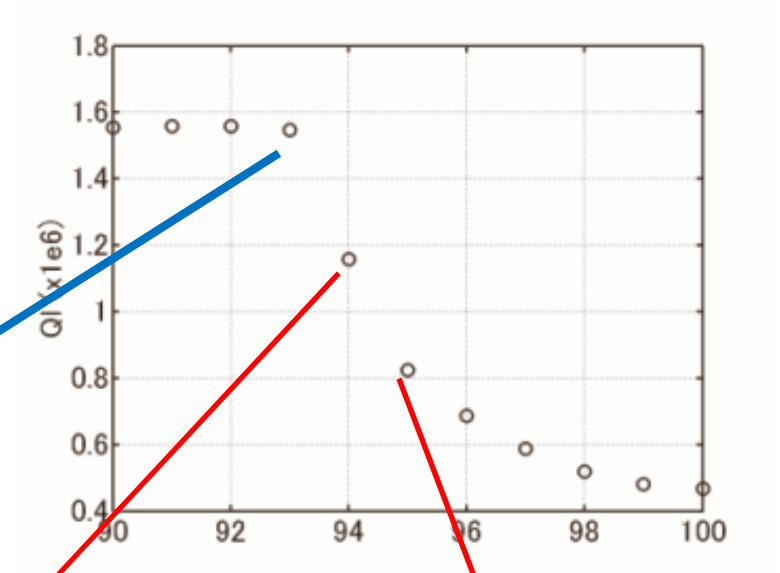
- Operation of 8 cavities under FB control
  - Fast interlock system using loaded-Q monitor
  - Vector sum FB control of 8 cavities under piezo compensation
  - Vector sum FB control with IF-Mix scheme
  - Feedback instability

# Loaded-Q monitor

- Loaded Qs of the cavities can be calculated using a decay curve of the cavity field.
- Real-time loaded-Q monitor is under development.

## Study goal

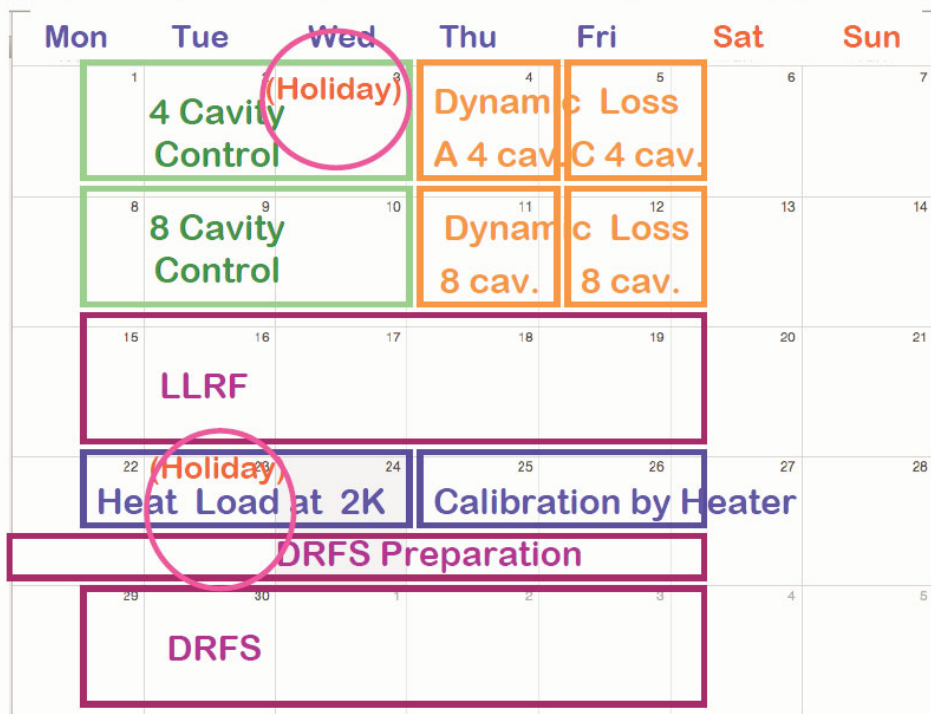
- Performance evaluation: Calculated Q values will be used for the quench detection.
- Functionality as a fast interlock: RF output will be stopped simultaneously.



# S1-G schedule for DRFS study

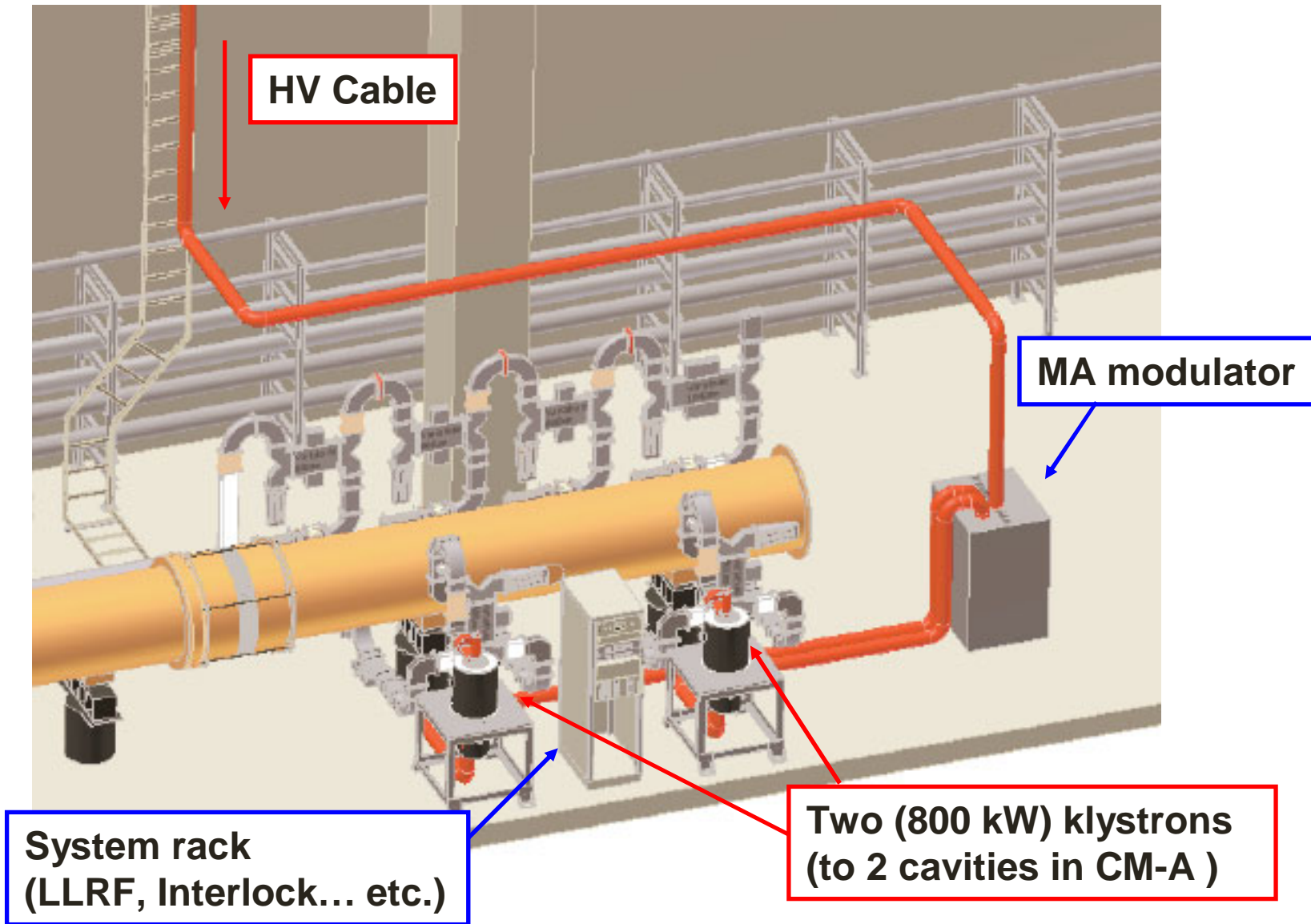
November, 2010

December, 2010



- DRFS system evaluation
  - Fast interlock performance
  - Field regulation
  - Sag compensation
  - Cavity filling procedure
  - Forward & reflection monitor without circulators
  - Klystron output characteristics under rf reflection

# DRFS in S1-Global

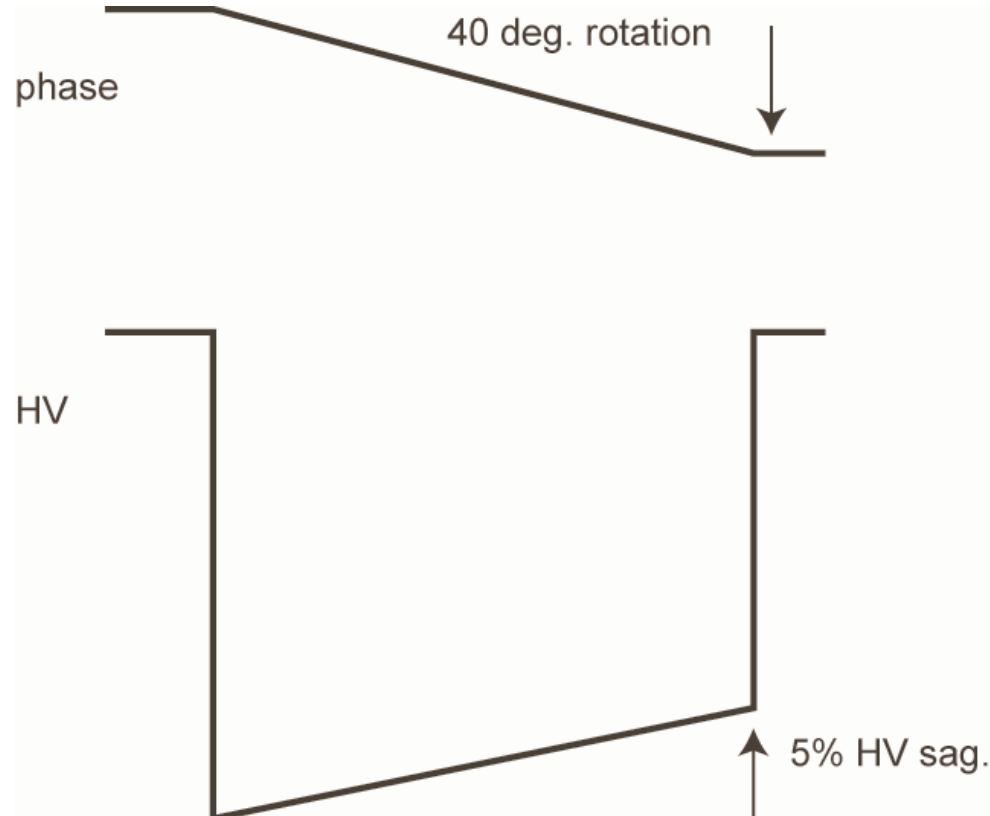


# Sag compensation

- HV sag (~5%) will cause 40deg. Rotation. (8deg./%)
- This will degenerate the feedback stability and compensation is the essential for high feedback gain.

Study goal

- Proof of sag compensation

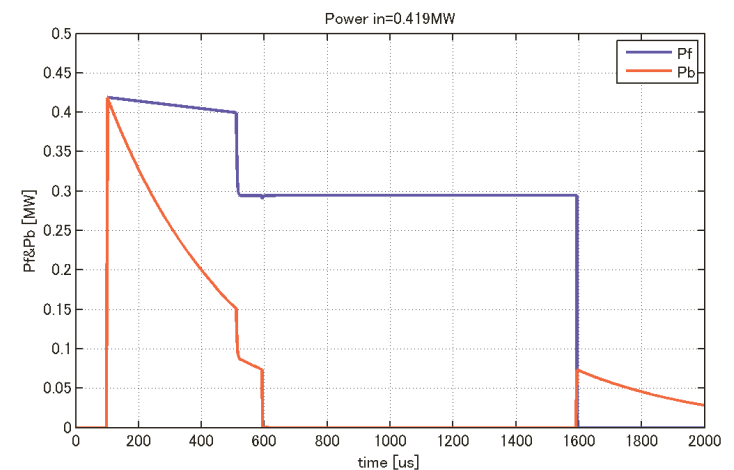
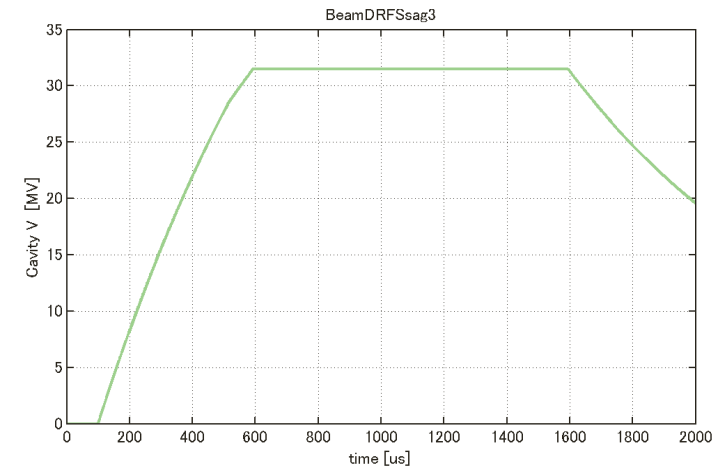
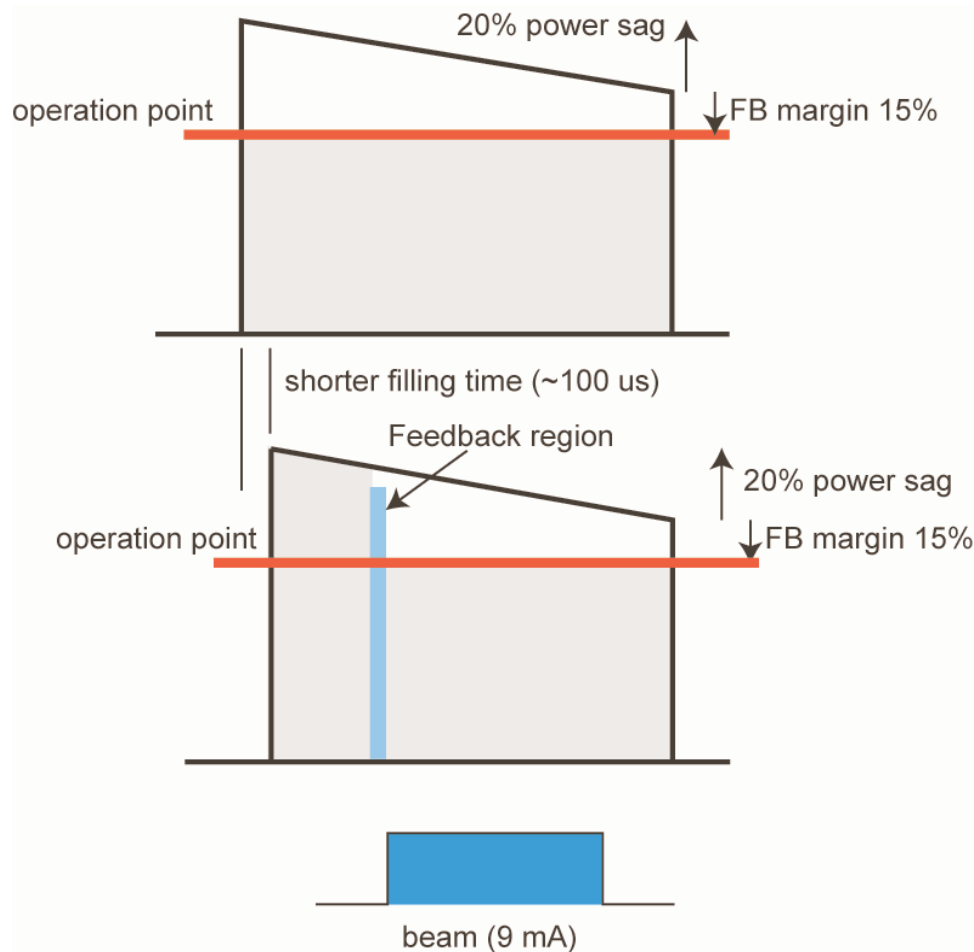


# Full power filling scheme

- In order to use the rf power under sag efficiently, full-power filling scheme is proposed.
- By using the full-power filling, shorter rf pulse will be enabled.

## Study goal

- Proof of the scheme





# Circulator effects

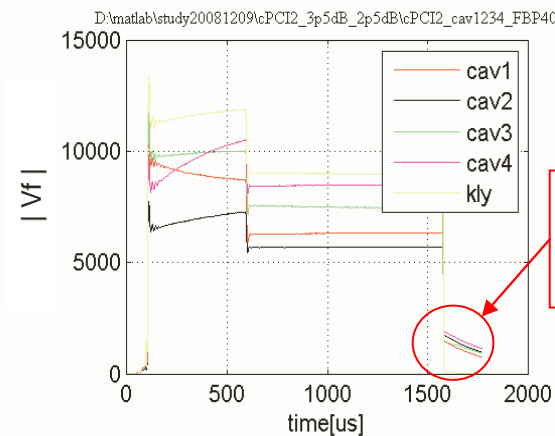
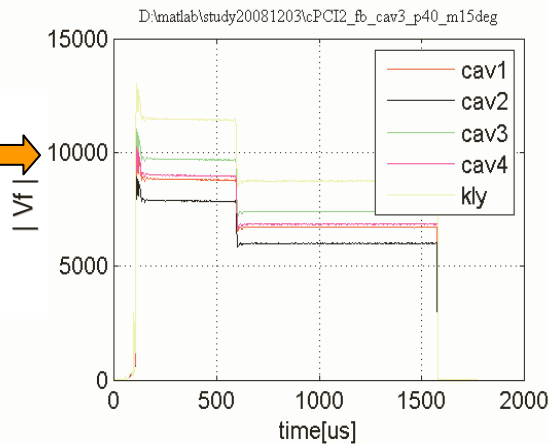
■ The previous study (STF-1) indicate high isolation will be required at hybrid in order to estimate the cavity parameters (such as QI and detuning).

Study goal

■ Study of the rf isolation with new hybrid system suitable for DRFS

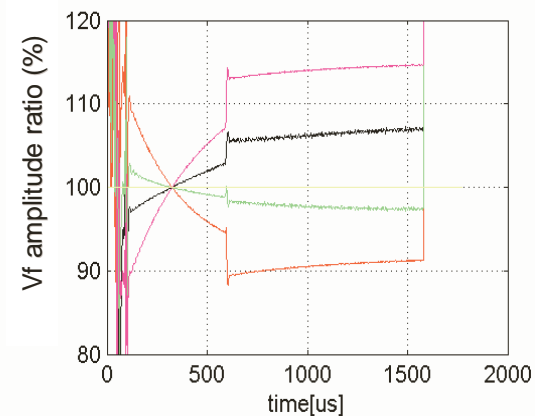
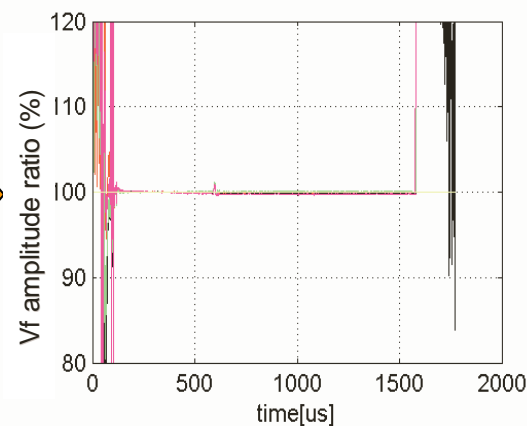
## *With circulators*      *Without circulators*

Cavity input



Cavity input exists even after RF off

Normalized by klystron output



# Circulator effects (2)

- Klystron output depends on the reflection to the klystron itself.
- In case of the unbalanced operation (or different cavity detuning each other), the reflections cannot be canceled.
- Study goal: Evaluation of the effect of the reflection signal to the klystron

