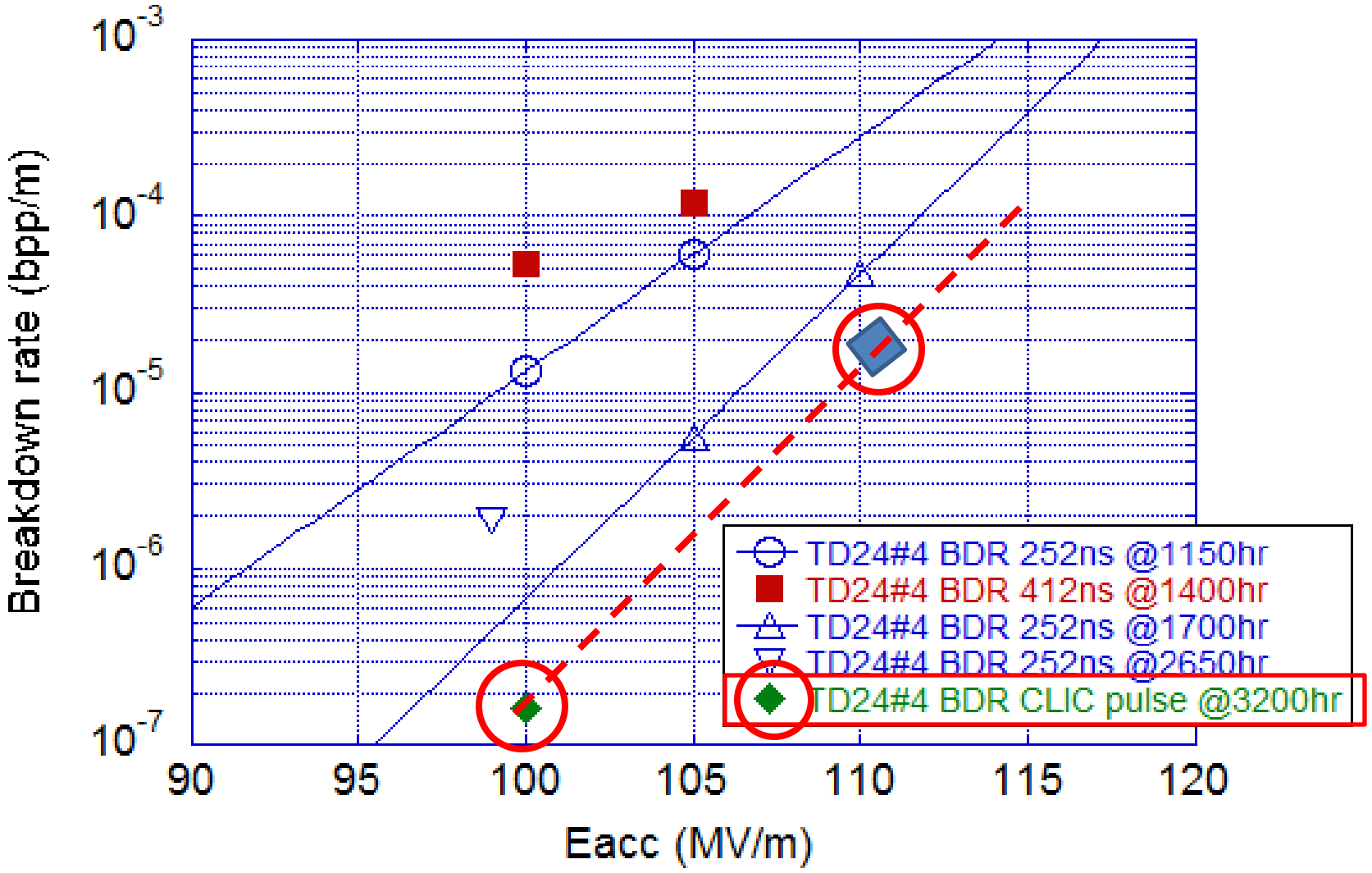
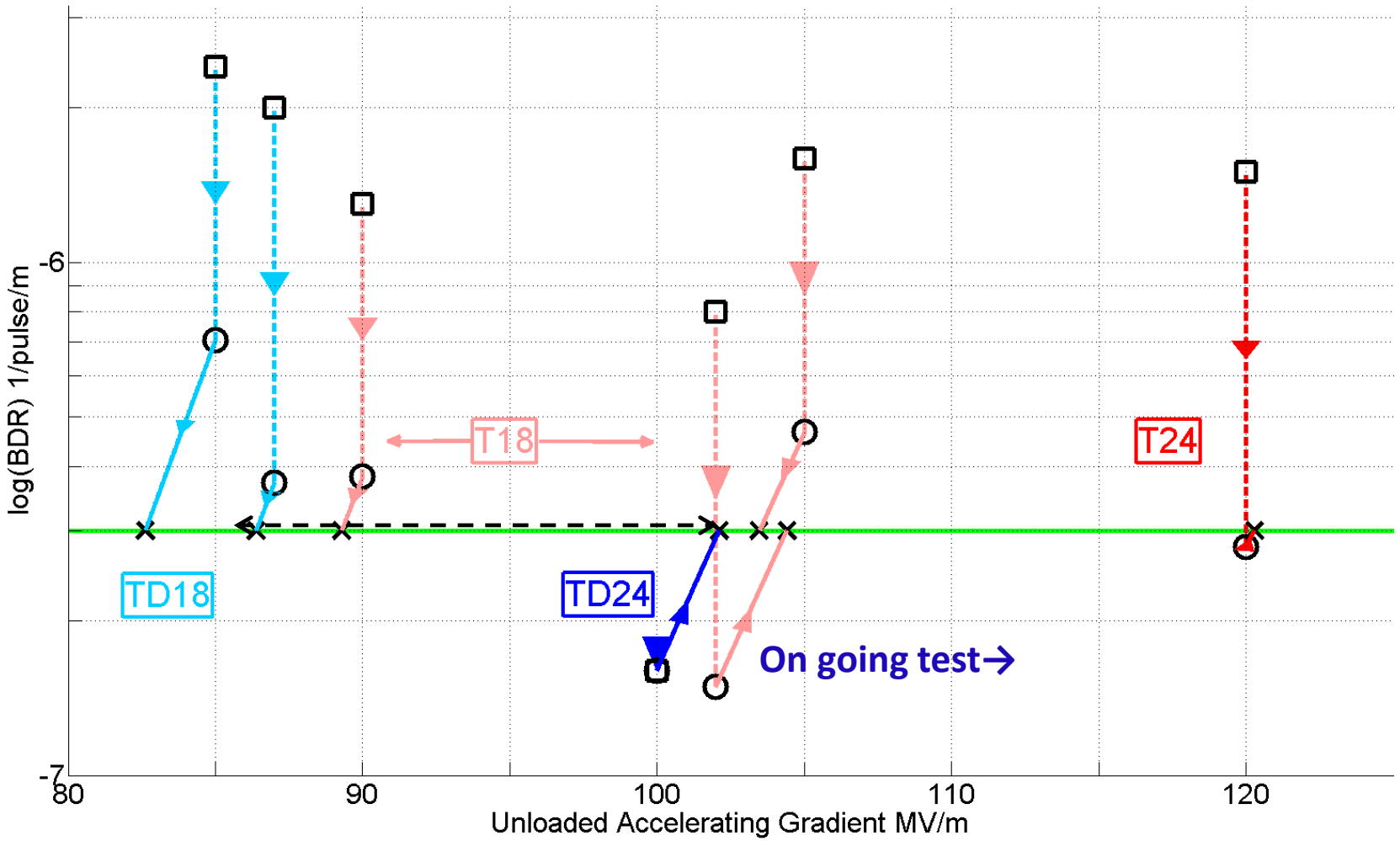
Topical session III: High-power test areas Introduction

W. Wuensch
CLIC collaboration meeting
10-5-2012

TD24#4 BDR with CLIC pulse at FLT=100MV/m



Accelerating gradient test status: 29-3-2012



Uncertainty range due to the effect of beam loading. This will be measured for the first time in the "dog-leg."

Much more information

https://indico.cern.ch/conferenceDisplay.py?confId=165513

Some thoughts about the next steps

Here's a partial list of some subjects we must address next. Some work you will already hear about in the next days. I will give some more detail on the first four:

- Measure the effect of beam loading on breakdown rate.
- Understand the difference between damped and undamped structures – 20% gradient to be gained.
- Increase and spread high-power generation and testing capability.
- Need to test more structures and for longer.
- Reproduce results with compact power couplers and damping load material installed.
- Re-optimise CLIC linac for staged energies and higher efficiency.
- Investigate alternative structures – choke mode, DDS, quadrants – as well as crab and deflecting cavities.
- Optimize the fabrication method and get ready for mass production.
- Advance theoretical and experimental study of breakdown and high-gradient phenomena.

Tentative 2012 program

Test stand	#1 1 Q/2012	#2 2 Q/2012	#3 3 Q/2012	#4 4 Q/2012
NEXTEF	TD24[4] →		TD24_r05[2] →	
CERN 12 GHz		T24[1]	TD24_r05 →	
TBTS	TD24[1] →		TD24 wake monitor →	

Request to test DDSA and crab-cavity at CERN

S. Doebert
KEK workshop

Tentative 2013 program

Test stand	#1 1 Q/2013	#2 2 Q/2013	#3 3 Q/2013	#4 4 Q/2013
NEXTEF	TD24_r05[x] →			
CERN 12 GHz (1)	Beam loading experiment (CTF3)	TD26_CC	DDSA	TD24_SiC
CERN 12 GHz (2)			Crab-cavity	TD26_SiC super-structure
TBTS	TD24 wake monitor →			

Need to agree on longer term program, which structure for statistics and studies (TD24_r05 ?)

Status of X-band test areas

Existing areas:

- NEXTEF, KEK – Running and running and running. Full program. We hope to continue for many years more.
- NLCTA, SLAC – We had some great times but is now entirely dedicated to photon science.
- ASTA, SLAC – Is available for testing but on a full cost basis only.
- Klyston at CERN – Still commissioning.

We intend to supplement these stands with:

- A test stand at CERN using the first 50 MW XL-5 tube from CPI that we've ordered.
- A test stand at a collaborator using the second 50 MW XL-5 tube from CPI that we've ordered.
- A test stand at CERN based on a combined 5 MW, high-repetition rate tubes.

Budget and technical profile in the medium term

Budget [MCHF]	2012	2013	2014	2015	2016	2017	
Design	0.2	0.2	0.2	0.2	0.2	0.2	
Production	1.2	1.6	1.9	2.4	2.8	2.8	
Test areas	2.8	2.8	2.8	0.0	0.0	0.0	8.4
Testing	0.3	0.4	0.6	0.7	0.8	0.8	
High gradient	0.2	0.2	0.2	0.2	0.2	0.2	
Totals	4.7	5.2	5.7	3.5	4.0	4.0	27.1
Cost inputs							
	Infrastucture	rf	Total				
Initial installation for test stands	1.7		1.7				
Marginal cost for one test stand	0.2	1.8	2				
Full cost structure			0.3				
Testing year cost per stand			0.12				
KEK	Operate						
CERN 1 (SLAC)							
CERN 2 (CPI1)							
Collaborator (CPI2)							
CERN3 (5 MW)							Sum
Number 50 MW stands	1	2	3	4	4	4	18
Number 5 MW stands	0	0	0	0	1	1	
Number structures tested	2	4	6	8	12	12	44

Activity broken down by collaborator and work package based on received sheets and/or presentations.

	Design	Production	Test areas	Testing	High-gradient
CEA, Saclay			■	■	
Helsinki/NorduCLIC		■			■
IFIC, Valencia			■		
KEK	■	■	■	■	■
Lancaster	■				
Manchester	■				
Oslo/NorduCLIC	■				■
PSI	■	■			■
Trieste			■	■	
Tsinghua	■	■			
Uppsala/NorduCLIC			■	■	■
JINR		■			
12	6	5	5	4	5

And we still have a pipeline (partial list): Argonne, EPFL, ESA, F4E, Fermilab, Groningen, Sandia, SLAC, Sumy, Tartu, TERA.

Summary slide from collaboration resource meeting last November, http://indico.cern.ch/conferenceDisplay.py?confId=156004.

The objective of this session is to get an update on progress towards new high-gradient test areas hosted by collaborators.

Summary

CERN x-band test stand will start testing CLIC structures this year!

Further test stands under preparation, klystrons ordered, modulators under tendering.

And a message to our present and future collaborators:

For CERN

For YOU?