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# Two-beam Test-stand Organization and Planning

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# Two-beam Test-stand

## Versatile facility

- two-beam operation
  - high power drive-beam [32A to 100A at CLIC]
  - high quality probe-beam [0.9A to 1.0A at CLIC]
- excellent beam diagnostics, long lever arms
- easy access & flexibility for future upgrades

## Unique test possibilities

- power production & accelerating structures
  - beam loading
  - beam kick
  - beam dynamics effects
- full CLIC module
  - beam-based alignment



# Aims of the TBTS Test Programme

## Demonstration

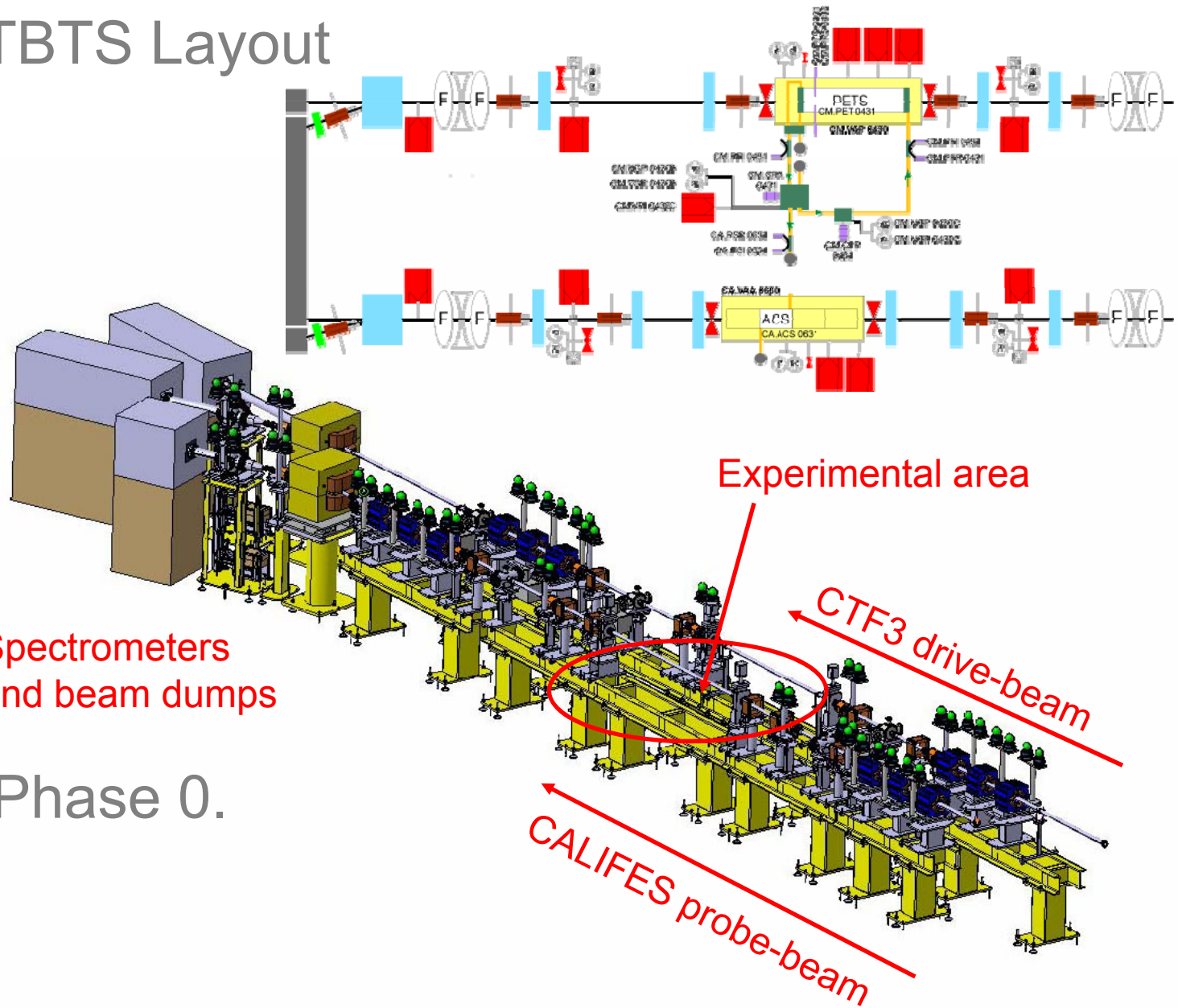
- power production in prototype CLIC PETS
- two-beam acceleration

## Experiments

- beam loading compensation
- beam dynamics effects
- beam kick due to breakdown or dipole modes
- breakdown rate
- dark currents



# TBTS Layout



Spectrometers  
and beam dumps

Phase 0.



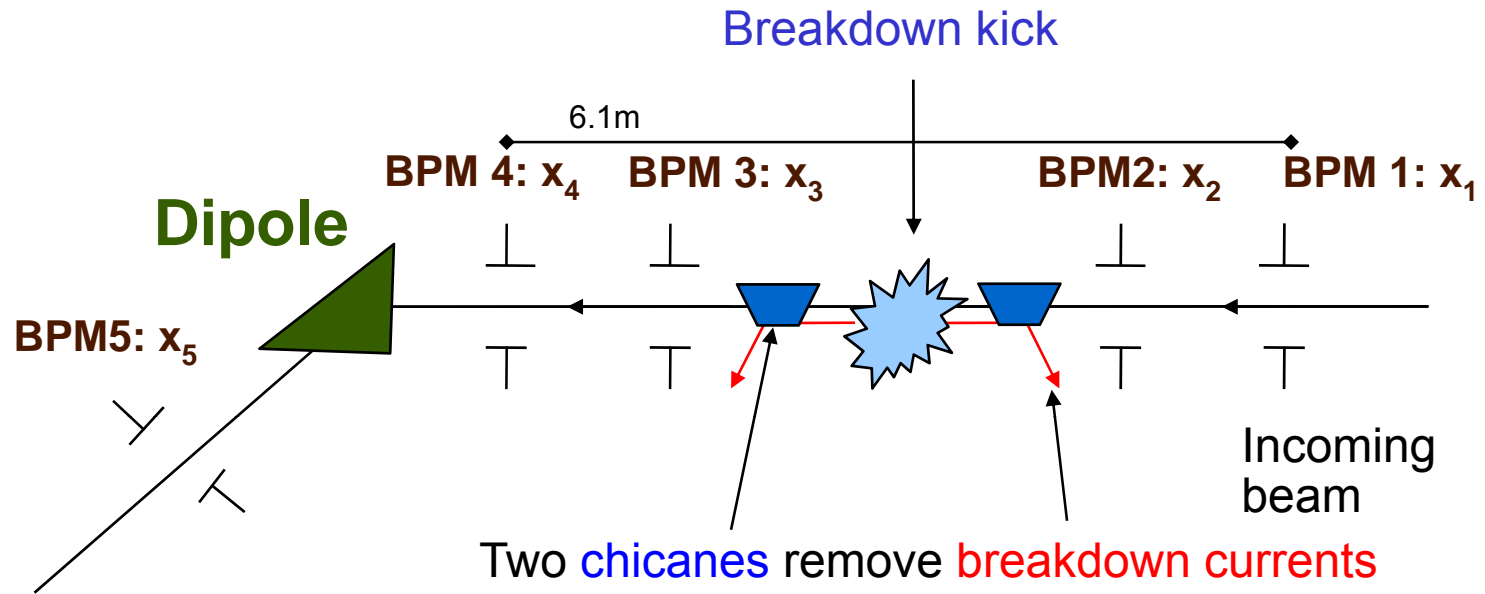
# TBTS Beam Parameters

			CALIFES long/single pulse	CALIFES short/multi pulse	CTF3 long pulse	CTF3 nominal
<b>Initial Beam</b>						
energy	E_0	[MeV]	180	180	150	150
bunch charge		[nC]	0.06	0.6		
bunch frequency		[GHz]	1.5	1.5	1.5	12
intensity	I	[A]	0.09	0.9	5	32
burst length	t_b	[ns]	150	20.67	300	140
repetition rate	f	[Hz]	5	5	5	5
power	P	[W]	12.2	16.7	1125.0	3360.0
Lorentz factor	$\gamma$		352.3	352.3	293.5	293.5
emittance	$\epsilon_n$	[m]			1.50E-04	1.50E-04
	$\epsilon_x$	[m]	2.56E-06	2.56E-06	5.11E-07	5.11E-07
	$\epsilon_y$	[m]	2.68E-06	2.68E-06	5.11E-07	5.11E-07
beta function	$\beta$	[m]				
	$\beta_x$	[m]	1	1	1	1
	$\beta_y$	[m]	1	1	1	1
at experimental area						
dispersion	$\delta$	[m]	0	0	0	0
momentum spread	dp/p		0.01	0.014	0.01	0.01
sigma	$\sigma_x$	[m]	0.0016	0.0016	0.0007	0.0007
	$\sigma_y$	[m]	0.0016	0.0016	0.0007	0.0007
beam size	x	[m]	0.0064	0.0064	0.0029	0.0029
	y	[m]	0.0065	0.0065	0.0029	0.0029

(see EDMS 841074)



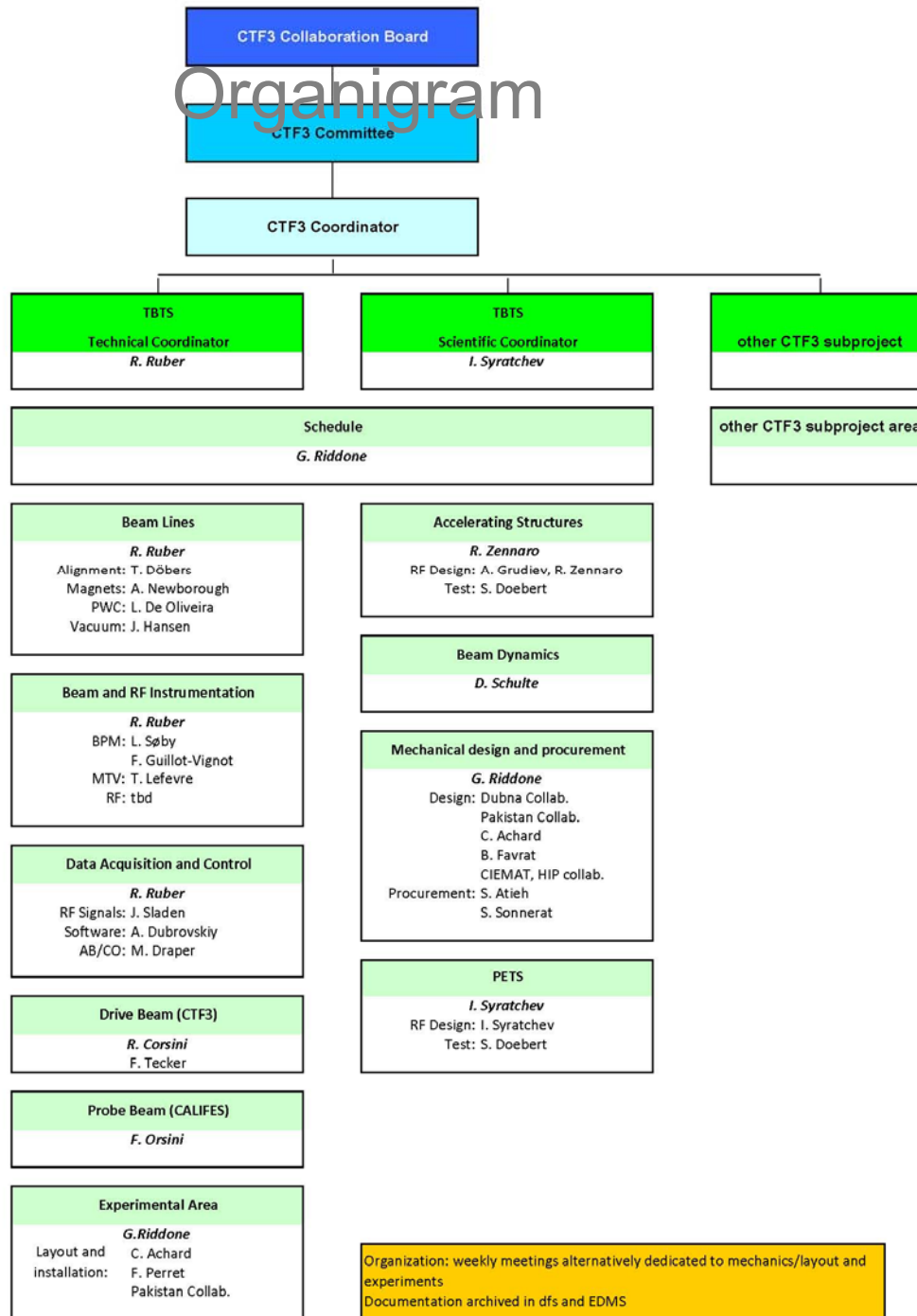
# Beam Kick Measurements



## Estimated error

- beam position:  $10 \mu\text{m}$ , angle:  $7 \mu\text{rad}$
- kick position:  $31 \mu\text{m}$ , angle:  $11 \mu\text{rad}$
- relative energy change from kick:  $32 \times 10^{-6}$   
(see M. Johnson, CLIC Note 710)

# Organigram



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