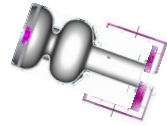


# PITZ Optimization at SRF Gun Gradient

Beam dynamics simulations: SRF photo injector (CW SRF PI)  $\leftrightarrow$  PITZ

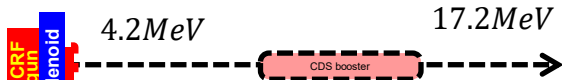
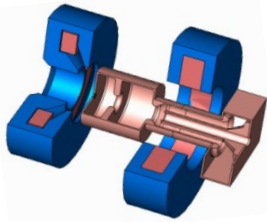
## Continuous Wave Superconducting RF Photo Injector (CW SRF PI)

120MeV

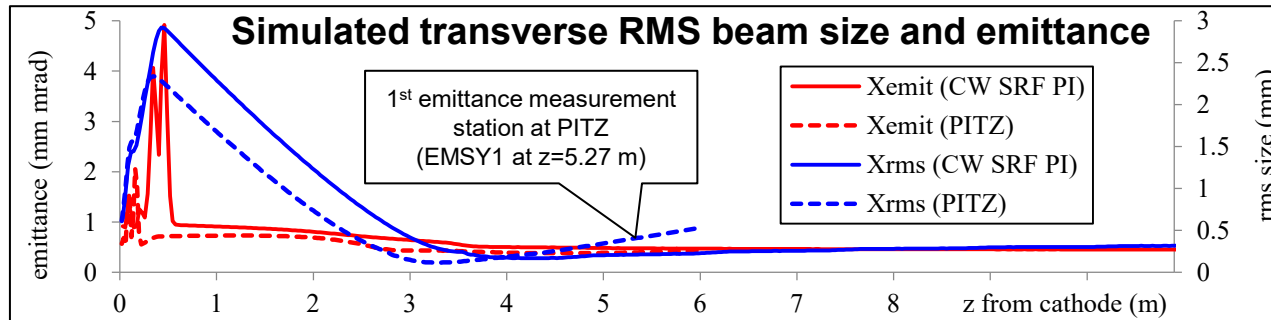


$E_{cath} = 40MV/m$

## Photo Injector Test facility at DESY in Zeuthen (PITZ)



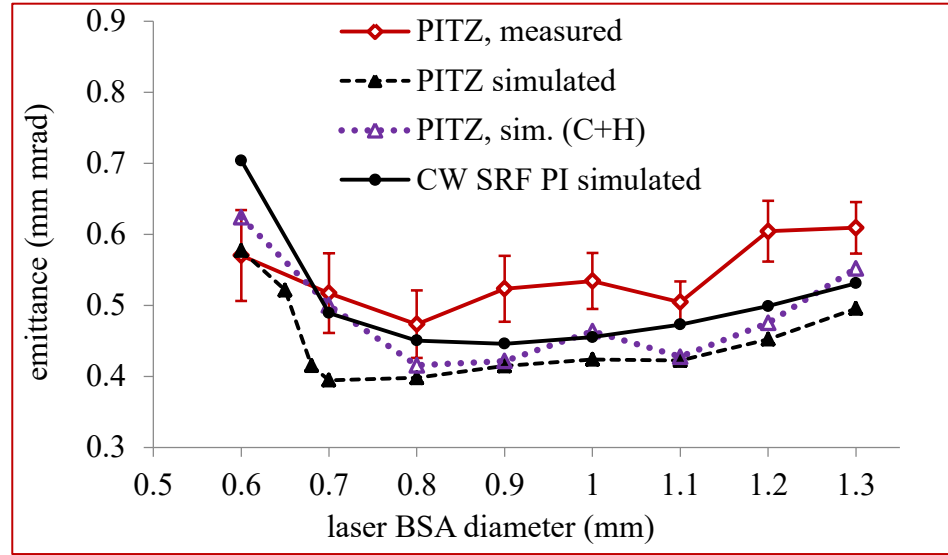
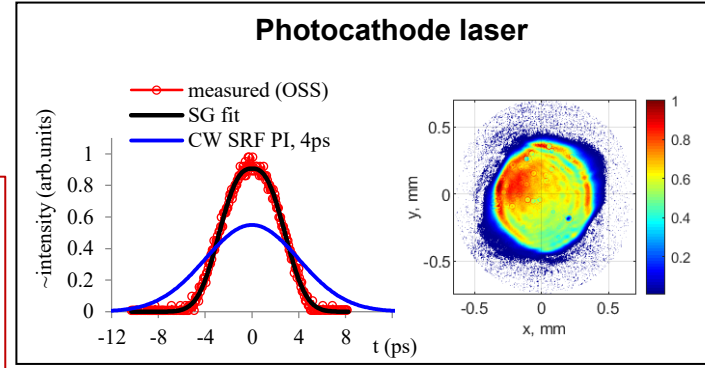
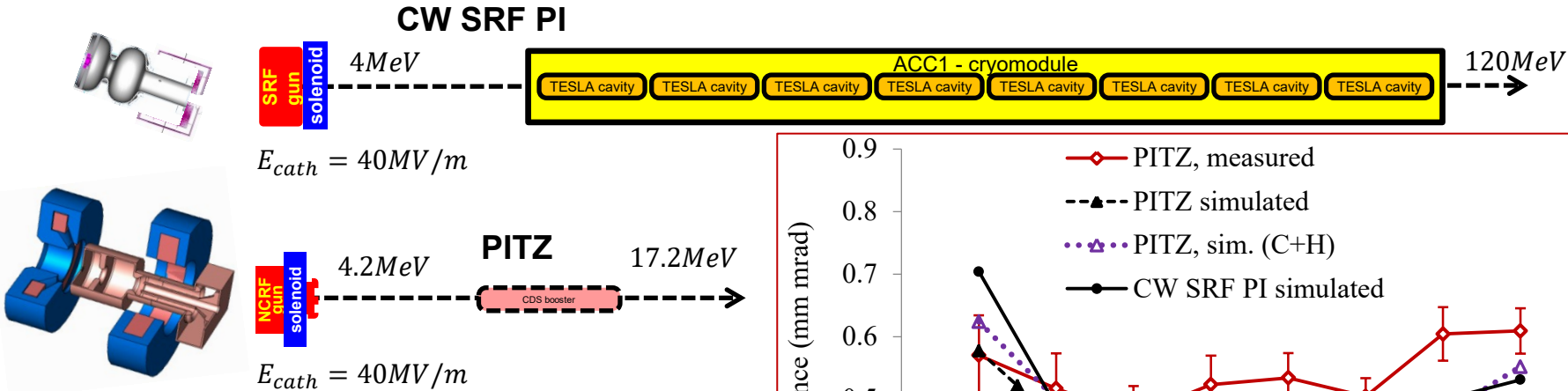
$E_{cath} = 40MV/m$



	Simulated electron beam	
	CW SRF PI	PITZ
Transverse phase space	$\epsilon_{x,n} = 0.45 \text{ mm mrad}$ 	$\epsilon_{x,n} = 0.39 \text{ mm mrad}$ 
Beam current and slice emittance	$\sigma_z = 1.35 \text{ mm}$ 	$\sigma_z = 1.43 \text{ mm}$ 
Longitudinal phase space	$p_{z0} = 120.5 \text{ MeV}/c$ 	$p_{z0} = 17.7 \text{ MeV}/c$ 

# PITZ Optimization at SRF Gun Gradient + Experiment

Beam dynamics simulations: SRF photo injector (CW SRF PI)  $\leftrightarrow$  PITZ



CW SRF Photo Injector setup (40MV/m, 100pC) has been reproduced at PITZ and expected beam emittance is confirmed by experimental optimization.

## Photo Injectors Optimization

parameter		CW SRF PI	PITZ
gun	E <sub>cath</sub>	40MV/m	
	Phase	tuned	MMMG
Photo cathode laser	Trms	3-4ps	2.6ps
	XYrms	tuned	
Solenoid	Position	0.4m	0.276m
	Bmax	tuned	
Electron beam	Charge	100pC	
	Energy	120MeV	17.2MeV
	I <sub>peak</sub>	7.45A	7.04A
	XY-Emit	0.45mm mrad	0.42mm mrad

