

# FACET-II Science Outlook



Facility for Advanced  
Accelerator Experimental Tests

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# Introduction

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- PWFA at FACET-II
- Accelerator and Beam Physics Roadmap for the next 20 years
- Long term future

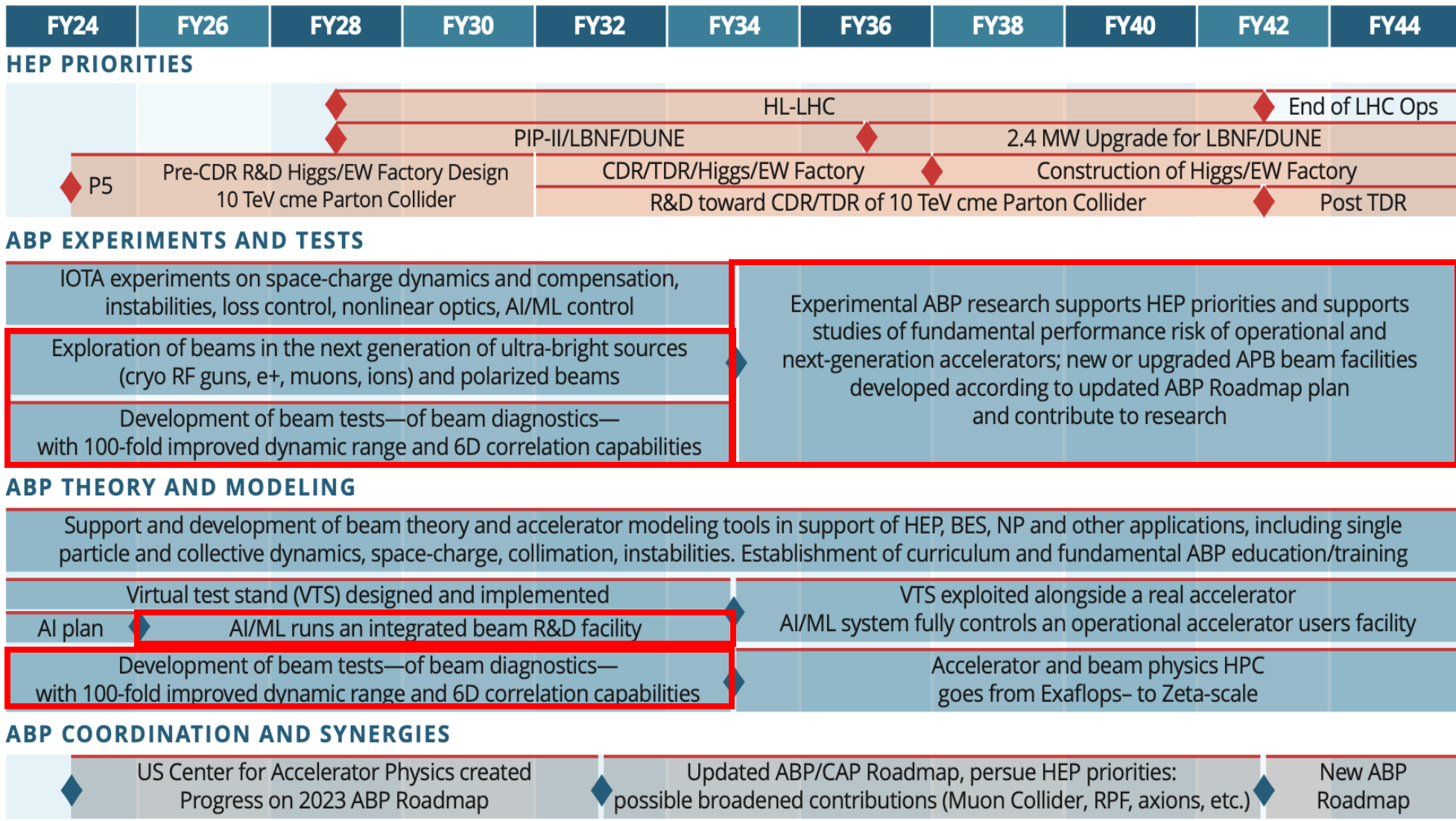
# PWFA at FACET-II

- AAC 2016 Roadmap Goals
  - Efficiency >10%
  - Gradient > 1 GeV/m
  - Pump depletion
  - Emittance preservation
- The current incarnation of PWFA (Li Oven) should be done in two years

Beam Driven Plasma R&D 10 Year Roadmap					
2016	2018	2020	2022	2024	2026
FACET		FACET-II Phase I: Electrons			
	Operating with high beam loading: Gradient > 1GeV/m, Efficiency > 10%				
Present			Goals		
9 GeV			10 GeV		
Q ~ 50 pC			Q ~ 100 pC		
$\epsilon \sim 100\mu\text{m}$		$\epsilon \sim 10\mu\text{m}$	FACET-II: External Injector		
$\Delta E/E \sim 4\%$		$\Delta E/E < 5\%$	$\epsilon \sim 1\mu\text{m}$		
Staging Studies			$\Delta E/E \sim 1\%$		
Goals			Transformer Ratio		
Characterization of active plasma lens at 10GeV			Present	Goals	
Beam quality preservation during injection and extraction			Gaussian Beams	Shaped Profiles	
Plasma source with tailored entrance & exit profile			T ~ 1	T > 1	

PWFA is on track to hit all milestones and expectations

# Accelerator and Beam Physics Roadmap for the next 20 years

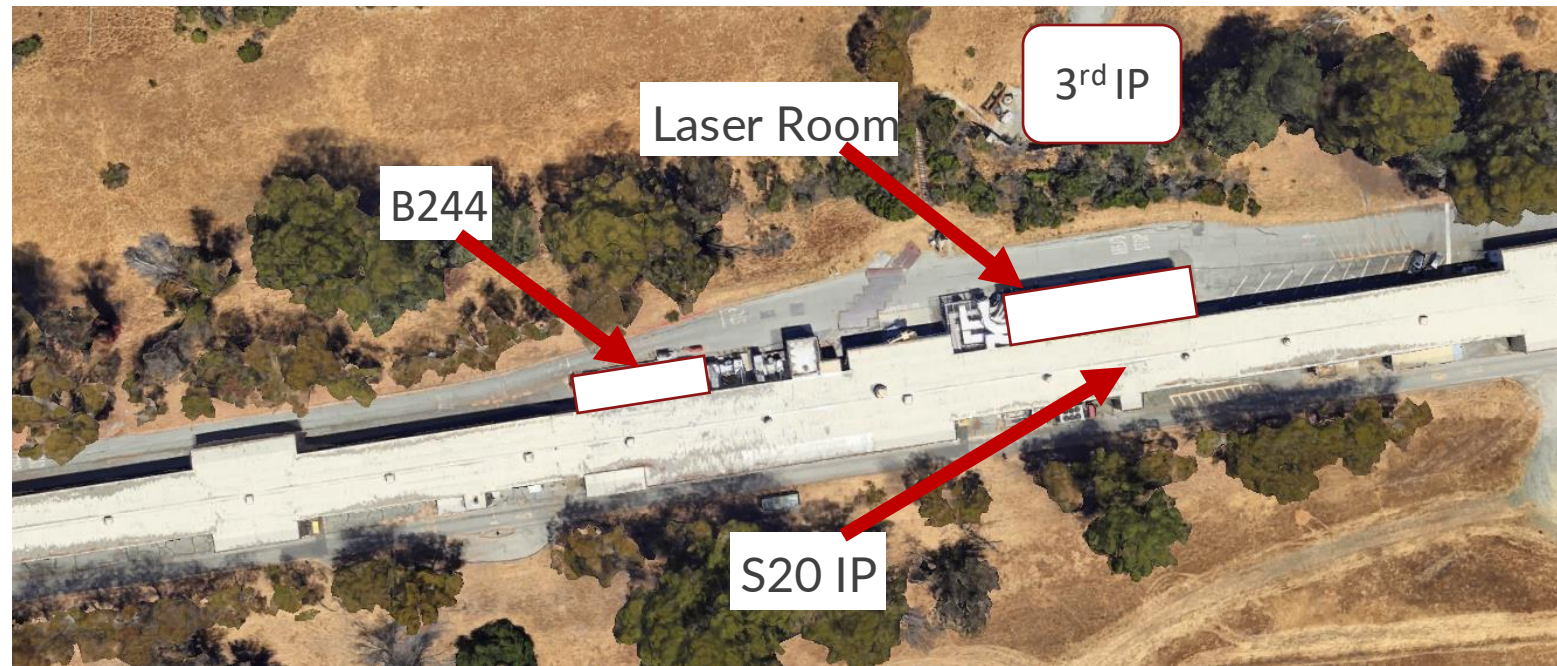


- Plasma injectors + brightness boosters
- Diagnostics and AI control
- Positron sources
- Beam test facility

There is an infinite breadth of physics that can be studied at FACET-II

# FACET-II evolutions

- FACET-II not limited by LCLS or LCLS-II
  - 100 TW laser upgrade,  $\chi \geq 1.8$
  - Third IP in the positron vault or beyond
  - PWFA powered light source
  - Staging demonstrator
    - SPARTA?
  - C<sup>3</sup> exploring IR-12
- P5
    - Off-shore Higg's Factory
    - 10 TeV PCM



The work to shape the future happens now

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# Questions?