



5<sup>th</sup> Steering Committee Meeting  
7 April 2017

## **WP13 progresses update**

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# Tasks and progresses

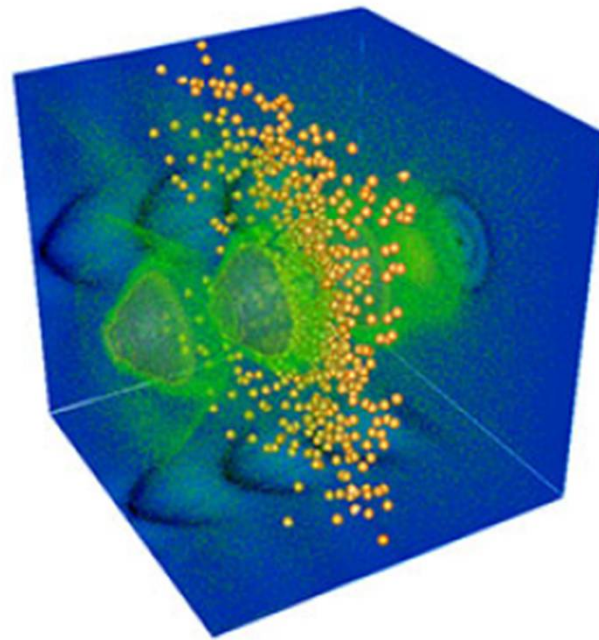
- **Task 13.1: Investigations of injection schemes for high quality electron bunches**
  1. Challenges: robust control of electron injection for beams with  $> 1$  GeV,  $> 50$  pC,  $< 1\%$  energy spread with a commercial  $\sim 200$  TW laser system.
  2. Mainly concentrated on **ionization injection, density gradient injection**
  3. Deliverable: Report in 36 months (due 11/2018).
  4. Recent related work carried out:
  5. Experimental and numerical observation of 3 electron beams; attosecond electron bunches with produced with density modulation. [M. Zeng et al. PoP (2016); M. Weikum et al., NIMPRA (2016); X. Yang et al., Sci. Rep. (2017); M. Tooley et al., submitted (2016)]

# Flash Physics: Laser wakefield delivers three beams, cat-litter nanosheets, Canada budget disappoints physicists

Mar 24, 2017

Flash Physics is our daily pick of the latest need-to-know developments from the global physics community selected by *Physics World's* team of editors and reporters

## Laser-plasma wakefield accelerators deliver three electron beams



**Physics World  
Highlight  
Mar. 24, 2017**

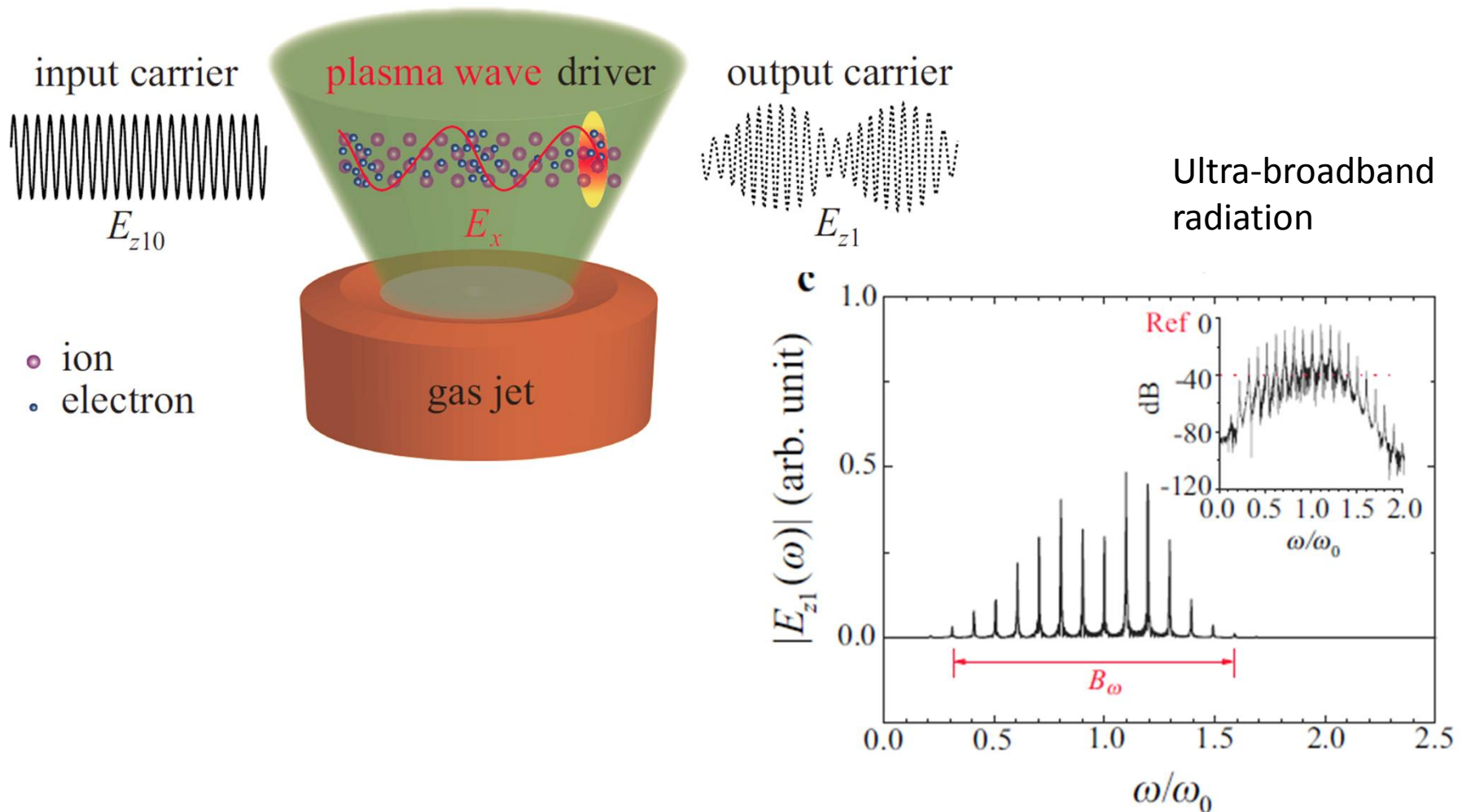
X. Yang et al., *Sci. Rep.* (2017)

# Tasks and progresses

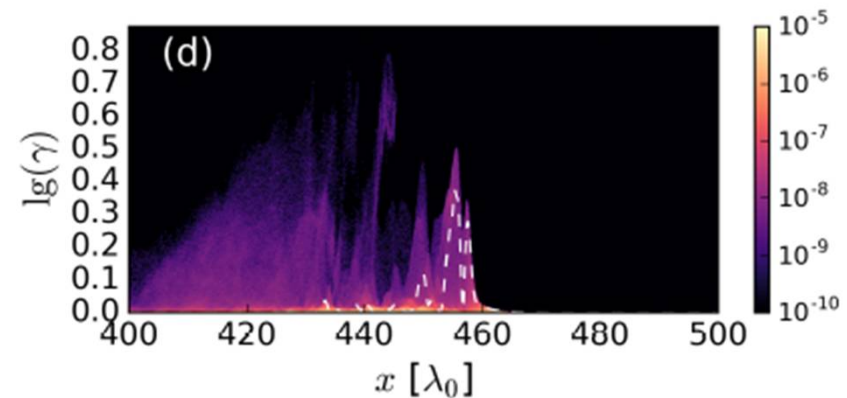
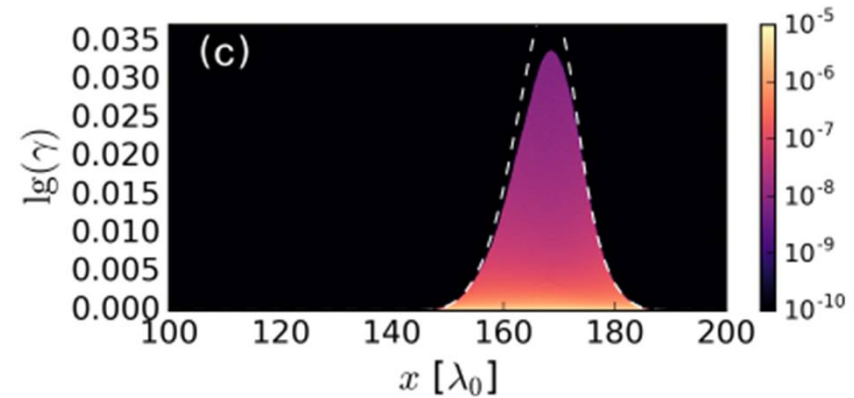
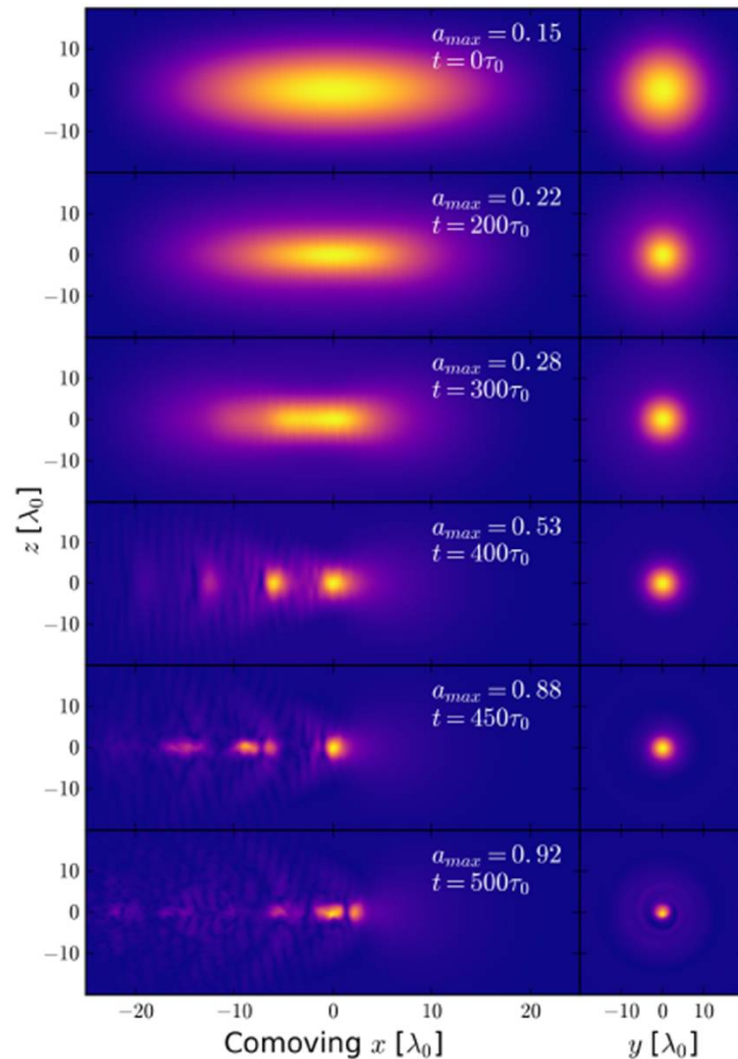
- **Task 13.2: Extension of spectral range of plasma-based radiation sources to gamma-rays and the far infra-red**
- **Task 13.3: Investigations of coherence development in plasma-based radiation sources**
  1. **Deliverable: Report in 48 months (due 11/2019).**
  2. Recent related work carried out: (a) ultrabroad band laser radiation by laser wakefield modulation; (b) laser propagation along strong magnetic field for electron acceleration; (c) coherent XUV radiation from laser wakefield; (d) enhanced betatron radiation with ionisation injection [W.J. Ding & Sheng, PRE (2016); J. Luo et al., Sci. Rep. (2016); Y. Ma et al., Sci. Rep. (2016); L. L. Yu et al., Nat. Comm. (2016); T. Wilson et al., PPCF (2017); F.Y. Li et al., in preparation (2017)]

# A plasma optical modulator (for ultra-broadband radiation production)

Lu-Le Yu et al., Nature Comm. 7,11893 (2016).



# Reduced self-focusing laser power threshold for electron acceleration by use of strong longitudinal magnetic fields



T. Wilson et al., to be published in PPCF (2017).

# Tasks and progresses

- **Task 13.4: Development of diagnostic systems for investigating plasma-based radiation sources**
  1. Deliverable: Report in 36 months (due 11/2018).
  2. Several diagnostic systems are already in use at Strathclyde and some are under development.
  3. SCAPA laser has been delivered (350TW), new diagnostic systems are to be implemented for both laser systems (40TW & 350TW) with the support of a SCAPA equipment grant from EPSRC (starting from March 2017).