Notes for plenary discussion on EuPRAXIA layout

5 configurations considered at the moment

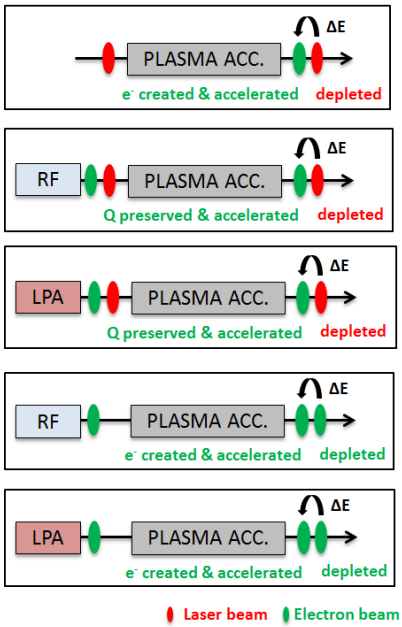
1) LWFA with internal injection

2) LWFA with external injection from an RF accelerator

3) LWFA with external injection from a LPA

4) PWFA with an RF electron beam

5) L2PWFA or Trojan Horse scheme



The following table shows the use of laser plasma injector (LPI) or RF injectors (RFI) and potential laser plasma stages (LPAS) and beam driven plasma accelerators (BPAS) for these individual cases with the intermediate/final electron beam energy noted:

Case #	Injector	Accelerator stage 1	Accelerator stage 2
1A	LPI 1GeV	LPAS 5GeV	
1B	LPI 5GeV		
2A	RFI 0.15GeV	LPAS 1GeV	LPAS 5GeV
2B	RFI 0.15GeV	LPAS 5GeV	
3A	LPI 0.15GeV	LPAS 1GeV	LPAS 5GeV
3B	LPI 0.15GeV	LPAS 5GeV	
4A	RFI	BPAS 1GeV	
4B	RFI	BPAS 5GeV	
5	LPI	BPAS 3GeV	

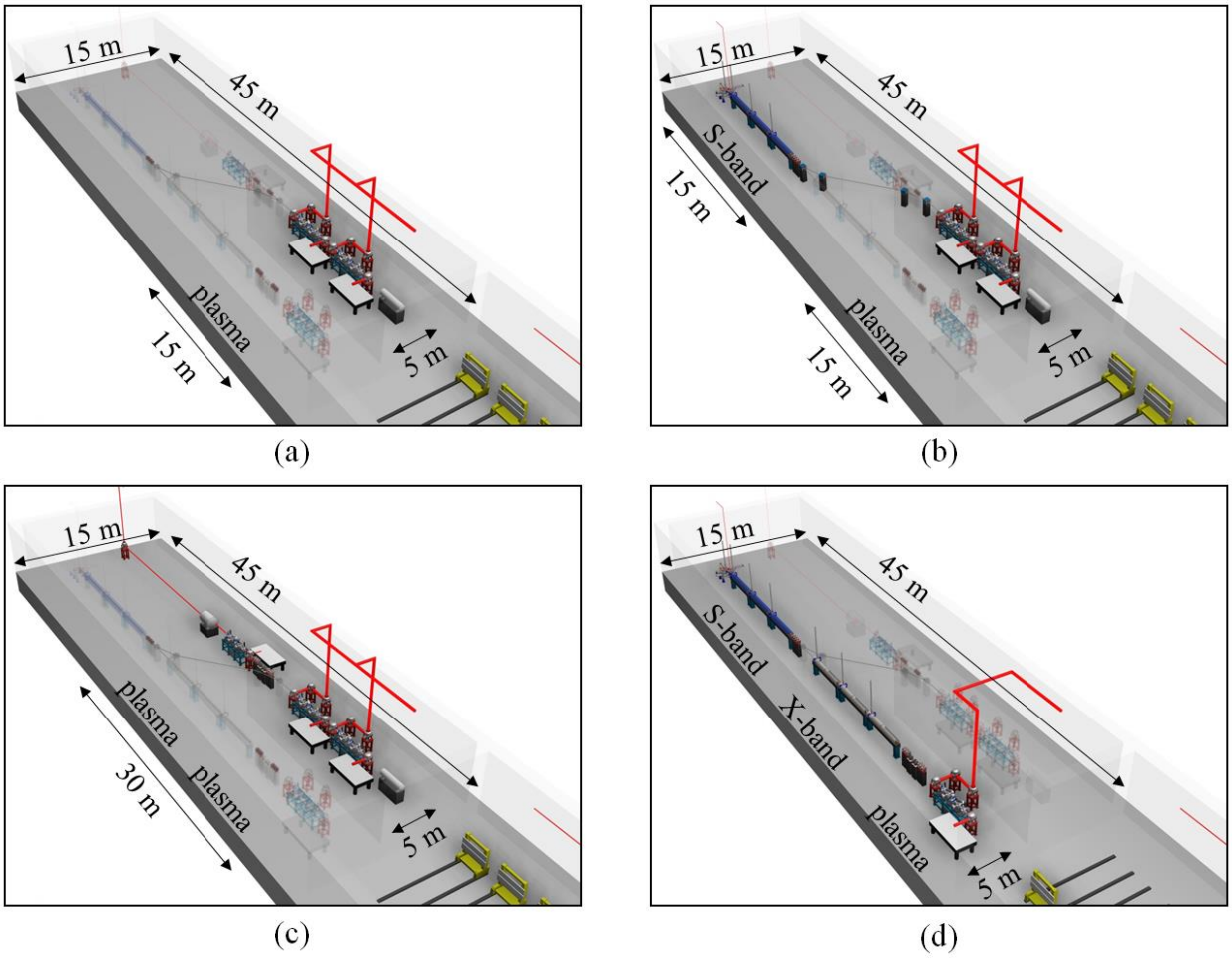
LPA = laser plasma injector;
LPAS = laser plasma accelerator stage;
RFI = RF-injector;
BPAS = beam driven plasma accelerator.

Configuration 1 = (a)

Configuration 2 = (b)

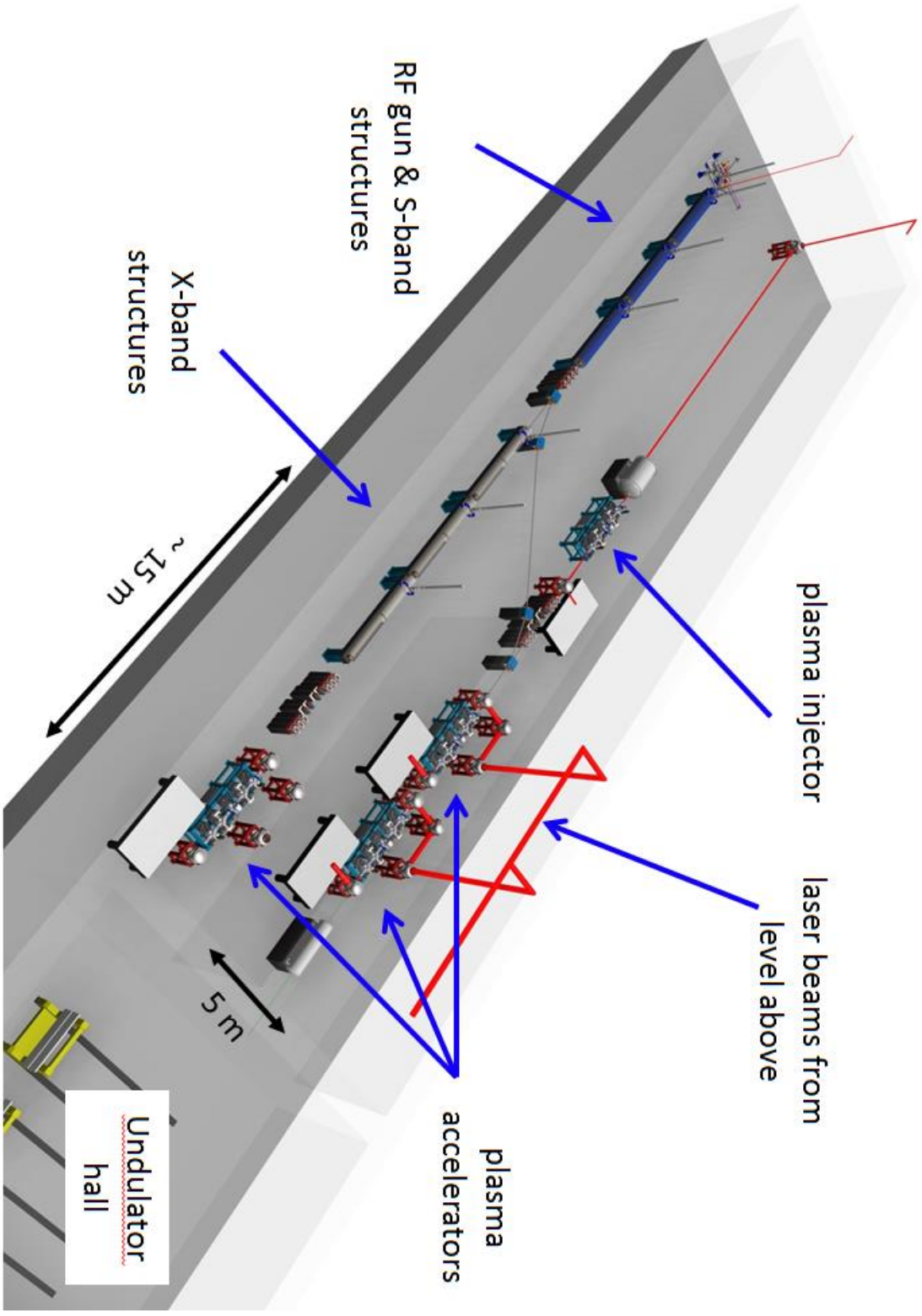
Configuration 3 = (c)

Configuration 4 = (d)



The preliminary layout of the EUPRAXIA accelerator level is shown. All RF and laser infrastructure is being supplied from the level above. Undulators (yellow) are shown in the bottom right corners. (a) Configuration 1: LWFA with internal injection. Two plasma stages are included which are supplied with two laser beams (red). (b) Configuration 2: LWFA with external injection from an RF accelerator. The RF gun and three S-band structures are shown in front of a dogleg which transports the electrons to the two plasma stages. (c) Configuration 3: LWFA with external injection from a laser plasma injector. An additional plasma stage, in front of the two plasma stages provides the electron beam. (d) Configuration 4: PWFA. Using the same infrastructure of RF gun and S-band structure, the PWFA case uses additional X-band structures to accelerate the beam to several hundred MeV before using it inside a single plasma accelerator stage. Configuration 1 to 4 can incorporate configuration 5.

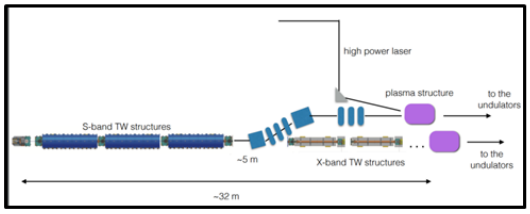
All configurations combined in one layout:



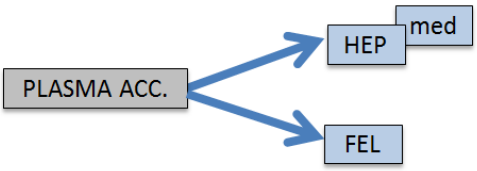
Questions to discuss:

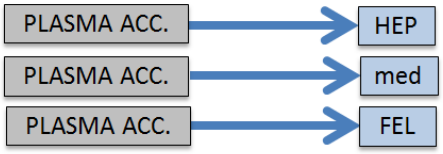
- Laser driven and/or beam-driven?
  - Status: include both

From WP5 meeting in January 2017 by Enrica Chiadroni

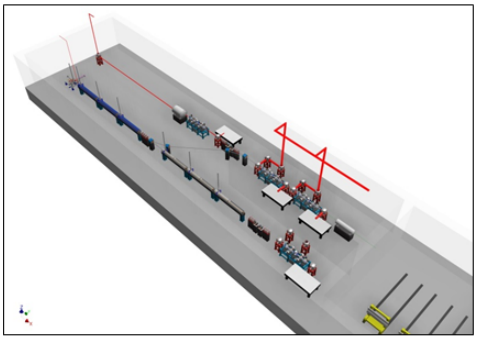


- Do we use a switchyard or several independent accelerator lines?
  - Status: use switchyard





- Are all necessary components included? Is something missing?
  - e.g. beam dump needs to be included, …



- How do we adjust layout for individual sites?
  - Status: individual facilities do this work themselves

Additional questions from you:

- …
- …
- …