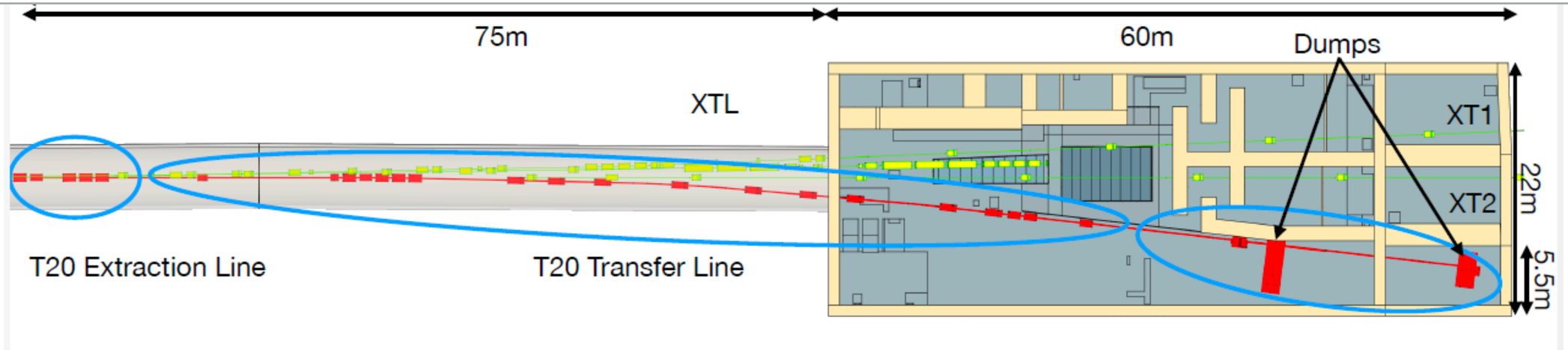
ELBEX AS A USER FACILITY

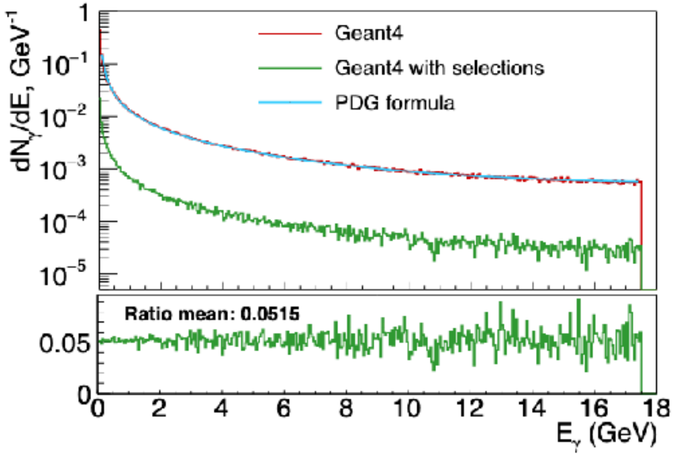
LOUIS HELARY

ELBEX KICK-OFF MEETING - JANUARY 28TH 2025

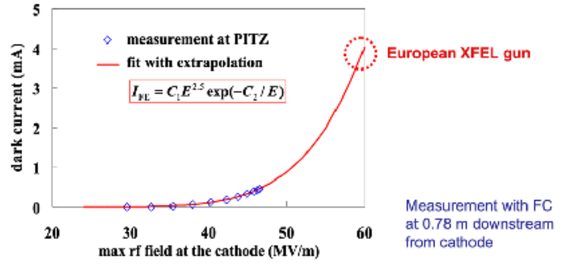
ELBEX CHARACTERISTICS



Parameter	Value XFEL.EU	Assumed Values for LUXE
Beam Energy [GeV]	≤ 17.5	16.5
Bunch Charge [nC]	≤ 1.0	0.25
Number of bunches/train	2700	1
Repetition Rate [Hz]	10	10
Spotsize at the IP [μm]	–	5
Bunch length [μm]	30–50	30–50
Normalised projected emittance [mm mrad]	1.4	1.4



Estimation of dark current for the XFEL



Dark current might be more serious problem at the Euro-XFEL

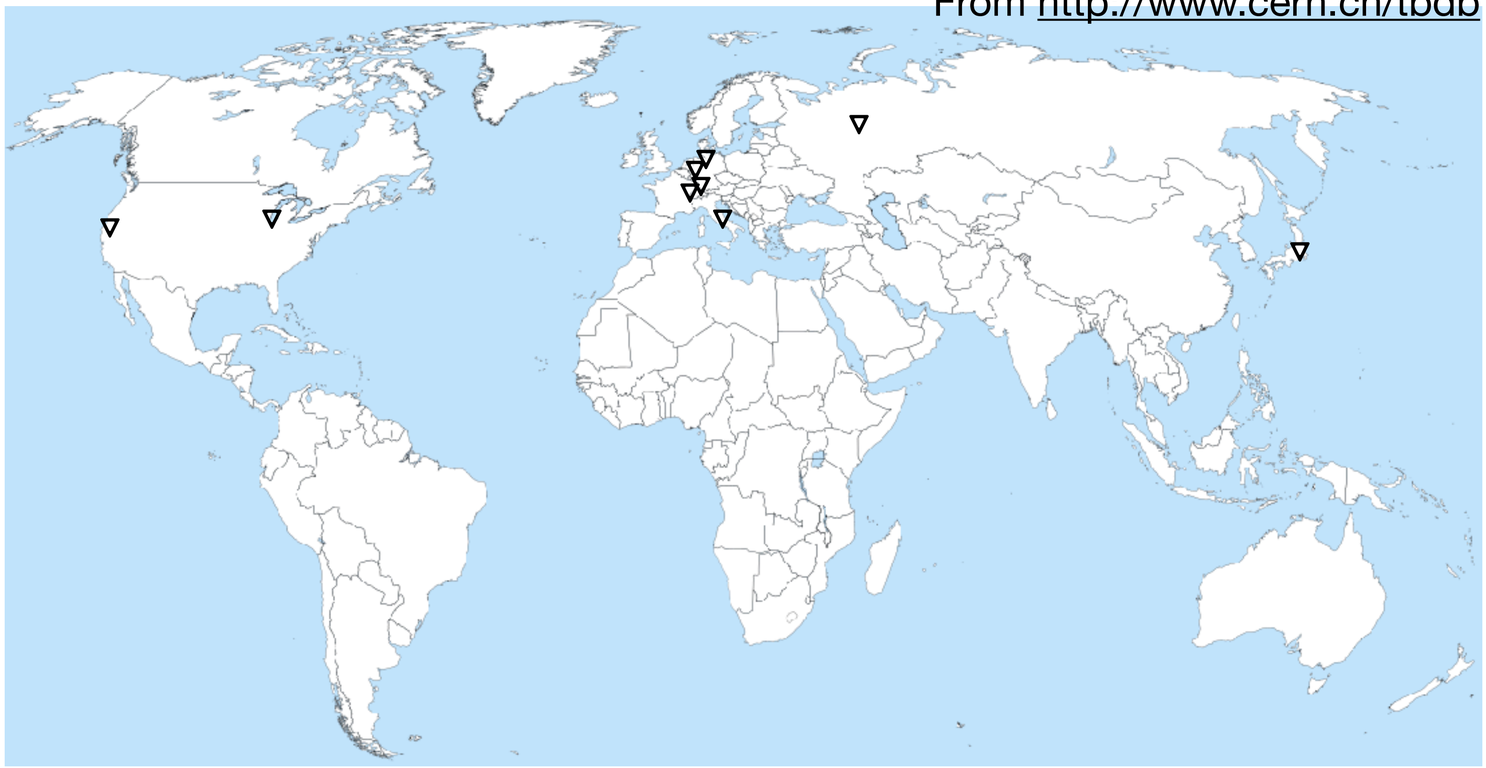
jang.hui.han@desy.de XFEL Beam Dynamics Meeting, 19 June 2006

- ELBEX could provide up to 16.5 GeV electrons with extremely good quality at reasonable repetition rate (10 Hz).
- ELBEX designed to also provide high energy GeV photon beam through Bremsstrahlung target.
- Could also deliver single particle like electron thanks to dark current (~mA)
- Experimental area foreseen along the beam axis:
  - ~1m to about 15m depending on what is being counted.
    - Access might limit the user community though.

ELECTRON BEAM FACILITIES IN THE WORLD

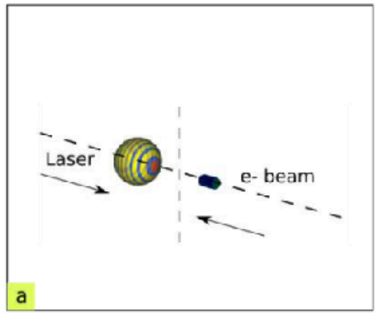
Name	Institute	Country	Particle types	Energy
CERN PS	CERN	Switzerland	electrons, hadrons, muons (secondary)	0.5 - 10 GeV/c
CERN SPS	CERN	Switzerland	electrons, protons, hadrons, muons, ions (secondary)	10-400GeV/c
CLEAR	CERN	Switzerland	electrons (prim.)	60 - 220 MeV/c
DESY II Test Beam Facility	DESY	Germany	electrons, positrons	1-6 GeV/c
ARES	DESY	Germany	electrons (prim.)	20 - 160 MeV/c
FTBF	FERMILAB	USA	electrons, hadrons, muons (sec.)	1-66 GeV/c
IHEP Protvino	IHEP Protvino	Russia	protons, pions, muons, electrons (secondary)	1-45 GeV/c
BTF	INFN-LNF	Italy	electrons, positrons (prim.)	(30-500) MeV, up to 750MeV (dedicated)
IHEP Beijing	Institute of High Energy Physics (IHEP)	China	electrons (prim.)	1.1 - 2.5 GeV/c
IHEP Beijing	Institute of High Energy Physics (IHEP)	China	electrons (sec.)	100 - 300 MeV/c
KEK ATF	KEK	Japan	electrons Primary	1.3 GeV
PiE1, PiM1, PiE5	Paul Scherrer Institute (PSI)	Switzerland	pions, muons, positrons, protons	50-450 MeV/c
ELPH	Research Center for ELectron PHoton Science (ELPH)	Japan	electrons, positrons (conv.)	0.1-1.0 GeV/c
SLAC	SLAC	USA	electrons (sec.)	1 - 4 GeV/c will upgrade to 8 GeV in 2026
LEPS2 beamline (BL31LEP)	SPRING-8	Japan	electrons, positrons	0.4 - 2.9 GeV/c
ELSA	University of Bonn	Germany	electrons (prim.)	1.2 - 3.2 GeV/c
MAMI	University of Mainz	Germany	electrons (prim.)	< 1.6 GeV/c
ELBEX (?)	EUXFEL - DESY	Germany	electrons (prim.), photons	up to 16.5 GeV/c

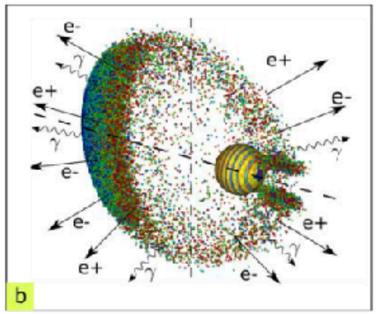
From http://www.cern.ch/tbdb



- Facilities exist worldwide to provide high energy electrons.
  - Currently no facilities exist with primary electron beam above 10 GeV!
    - ELBEX would be unique in this range!
      - Allow unique opportunities!

POTENTIAL USER COMMUNITIES





https://corels.ibs.re.kr/html/corels_en/research/research_0303.html

- Different communities could be interested:
  - SFQED (see Matthew's talk).
  - Plasma acceleration (see Benno's talk).
  - Detector development.
  - Irradiation.
  - Nuclear physics.
  - etc.

- Will organise workshop in next years to establish further user community that can be interested by ELBEX!