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nanobeam

Parameters and potential nanobeam applications of test facilities

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"towards a common strategy"

'two roads'

build up a realistic mini FF

ATF-FF LINX

- vibration issues
- engineering issues

instrumentation R&D

& exsisting facilities

Parameters of some test facilities

	2	3
CTF	40... 45 MeV	....150/300
	1... 13 nC	3.5... 35 A
	$\sigma_z \sim 10$ ps ~ 3mm	
	$\sigma_y \geq 150$ µm	50... 500 µm
large ε	$\varepsilon_n \sim 150$ µm	180 µm ... 100 µm
ATF	1.28 GeV ...	
	1nC	
	$\sigma_y \sim 1...5$ µm	$\sigma_h \sim 10...50$ µm
	$\varepsilon_n \sim 4 \cdot 10^{-8}$ m	$\sigma_z \sim 6$mm

++ stable high quality beam

higher energy, small ε, small σ

PETRA 4.5 ... 7 ... 12 GeV

0.8 nC

$\sigma_v \sim 10 \ldots 30\,\mu m$ ~ BDS sites

$\sigma_h \sim 300\,\mu m$

but: will be a 3rd gen. light source soon

TTF2 ... 1 GeV

1 nC

$\varepsilon_n \sim 10^{-6}\,m$

$\sigma \sim 10\,\mu m$ $\sigma_z \sim 50\,\mu m$

Fermilab ?

- planned to be a user facility for FEL
+ has a bypass beamline
+ beam / train structure à la TESLA

Possible R&D

beam size

laser wire → ATF
laser wire → PETRA
laser wire → CTF

ongoing

laser interferometer

→ need a small beam

transition radiation → CTF

only for one bunch? → TTF baseline

→ ATF diagnostic

wire scanners → TTF

→ many others

beam position

high resolution → 5μm feedback
→ ⋮
→ ~nm

bunch separation TESLA
< 20ns

BPM tests → ASSET
→ TTF2
⋮

how sensitive to radiation ?
striplines !

tilted beams → ATF

effect of tails

bunch length

EOS → TTF ...

deflecting cavities → TTF2

interferometers (TR) → TTF

laser beat wave ?

Crab Cavity

build a prototype
- Crab
- deflecting

phase stability
- kicker
- space correction

timing

250 fs ... 5 ps ... 50 ps

pump & probe FEL experiments TTF2

mask instrumentation

Lumi monitor → DESY
↘ ?

beamstr. monitor

solenoid stability

anything from existing ones?

final quads

build prototypes → SC for NLC
↘

vibration tests → any lab

mini FF

CTF3 ? $\sigma \sim 200nm$

FFTB II

CLIC ? Do we need it ? ATF2 ?

↓

$\sigma_y \sim 35nm$!

1.56GeV

++ real e^+e^- collisions

collimation

material tests → TTF2

↘ SLC ?

design tests ATF

Spoiler – absorber

energy

resolution 10^{-5} required

γγ

Laser R&D ! LLNL

NBI