Parameters and potential nano beam applications of test facilities

"towards a common strategy"

two roads

build up a realistic mini FF
ATF.FF LINUX
- vibration issues
- engineering issues

instrumentation R&D C existing facilities
### Parameters of some test facilities

<table>
<thead>
<tr>
<th>CTF</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td></td>
<td>40...45 MeV</td>
<td>150/300</td>
</tr>
<tr>
<td>1...13 nC</td>
<td>3.5...35 A</td>
<td></td>
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<tr>
<td>$T_2 \sim 10 \text{ps} \sim 3 \text{mm}$</td>
<td>50...500 $\mu\text{m}$</td>
<td></td>
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<tr>
<td>$\sigma_z \sim 150 \mu\text{m}$</td>
<td>$\sigma_y \sim 150 \mu\text{m}$</td>
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<tr>
<td>Large $\mathbb{E}$</td>
<td>$E_0 \sim 150 \mu\text{m}$</td>
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<table>
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<tr>
<th>ATF</th>
<th>1.28 GeV ...</th>
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<tbody>
<tr>
<td>1nC</td>
<td></td>
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<tr>
<td>$\sigma_y \sim 1...5 \mu\text{m}$</td>
<td>$\sigma_y \sim 10...50 \mu\text{m}$</td>
</tr>
<tr>
<td>$\sigma_x \sim 4 \cdot 10^{-8} \text{m}$</td>
<td>$\sigma_x \sim 6 \text{mm}$</td>
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</table>

+$+$ **Stable high-quality beam**

Higher energy, small $\mathbb{E}$, small $\sigma$
PETRA

4.5 ... 7 ... 12 GeV
0.8 nC
$\sigma_x \sim 10...30$ $\mu$m ~ BDS sites
$\sigma_y \sim 300$ $\mu$m
but: will be a 3rd gen. light source soon

TTF2

... 1 GeV
1 nC
$E_\gamma \sim 10^{-6}$ m
$\sigma \sim 10$ $\mu$m
$\sigma_\phi \sim 50$ $\mu$m

- planned to be a user facility for FEL
+ has a bypass beamline
+ beam / train structure à la PESCA
Possible R&D

beam site

laser wire → ATF
→ PETRA
→ CTF

laser interferometer

→ need a small beam

transition radiation → CTF

only for one bunch? → TTF → ATF baseline diagnostic

like scanners → TTF

→ many others
beam position

high resolution \( \rightarrow 5 \mu m \) feedback

\( \Rightarrow \)

\( \sim \) mm

bunch separation TESLA

\( \leq \) 20ns

BPM tests \( \rightarrow \) Asset

\( \rightarrow \) TTF2

: 

how sensitive to radiation?
striplines!

tilted beams \( \rightarrow \) ATF

effect of tails
bunch length

EoS $\rightarrow$ TTF ...

deflecting cavities $\rightarrow$ TTF2

interferometers (TR) $\rightarrow$ TTF

laser best wave?

crap cavity

build a prototype $\rightarrow$ crap,
deflecting kicker

phase stability $\rightarrow$ pspace correction

timing

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

pump & probe PEL experiments TTF2
mask instrumentation

Lumi monitor → DESY

beam str. monitor

solenoid stability

anything from existing ones?

final goods

build prototypes → SC for R&D

vibration tests → any lab
mini FF

FFTb II

CTF3? 6~200mm

LINX

+ real etc collisions

ATF2?

Do we need it?

$g \sim 35\text{mm}$

1.560V

collimation

material tests \rightarrow TTP2

design tests \rightarrow SEC?

Spoiler - absorber

energy

resolution $10^{-5}$ required

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Laser R&D! CCNL NBI