The Photo Injector Test facility at DESY Zeuthen (PITZ):

Results of the first phase
Recent developments
Future plans

A.Oppelt, DESY Zeuthen
Results of PITZ

RF conditioning

max. parameters reached 2003:
10 Hz, 900 µs RF, 3.3 MW input peak power
→ max. gradient at cathode ~42 MV/m
→ 0.9% duty cycle
→ 27 kW average power

parameters reached 2004:
up to 1300 µs RF → 1.3% duty cycle
max input peak power 4 MW
max. average power 33 kW

Studies on

• dark current
• photo cathodes
• charge production

Laser parameters
flat-top like longitudinal profile
~23 ps FWHM, ~6 ps fall/rise times,
homogeneous circular transverse profile

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Results of PITZ

Longitudinal phase space measurements of 2003:

Maximum mean momentum: 4.72 MeV/c
Minimum momentum spread: 33 keV/c
Minimum bunch length: (21.04 ± 0.45stat ± 4.14syst)ps

Recent results (2004):
max. mean momentum: 5.22 MeV/c
min. momentum spread reduced
bunch length measurement ongoing

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Results of PITZ

Emittance measurements:
2003 - min. normalized projected transverse emittance $\sqrt{\epsilon_x\epsilon_y} = 1.7 \pi \ \text{mm mrad}$
2004 - $2.5 \pi \ \text{mm mrad}$ reached, parameter space optimization ongoing
Future of PITZ

**PITZ2**
study the emittance conservation principle
→ install a booster cavity and a new diagnostics beamline
optimization of the photo injector and all subsystems
→ laser development, new guns, photocathodes and BD simulation tools