1. Dark Current Study
2. Damage of Cathode #78.1

Jang-Hui Han
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• Dark current generated at the gun has a similar beam dynamics as the electron beams.
• Collimators at the dog-leg cannot eliminate the dark current effectively.
• Possibly, the dark current is lost at the undulator.
Dark Current at the Gun

24 April 2006
at 2GUN
Measurement Points

0.78 m

1.27 m
Pressure Increase

Main solenoid current scan not possible
QE of Cathode #78.1

Abrupt decrease down to < 0.5%
Scan over the cathode surface
Measure bunch charge with the first ICT
(Program written by S. Schreiber)

\( \phi \sim 0.2 \text{ mm} \\
\text{step size 0.3 mm} \)
2D QE Map
Cathode #78.1 (relative QE)

when fresh (6 June 2006)

when damaged (11 July 2006)
View of the Cathode Surface

Photo taken at LASA after the preparation (5 April 2006)

Photo taken at DESY (7 August 2006) Not used since 11 July
Cathode Surface and QE

burned region

fresh region

low QE

high QE

2006-07-11 T081028-QE.dat

x position [mm]

y position [mm]
Low energy dark current from the gun might not make such damage

→ Dark current from the acceleration module?
→ Multiplying at the cathode?
→ ???

More study is necessary.
Dark Current from ACC1

50 MeV average $E_{\text{kin}}$
4 mm radius radial
~1 RF cycle