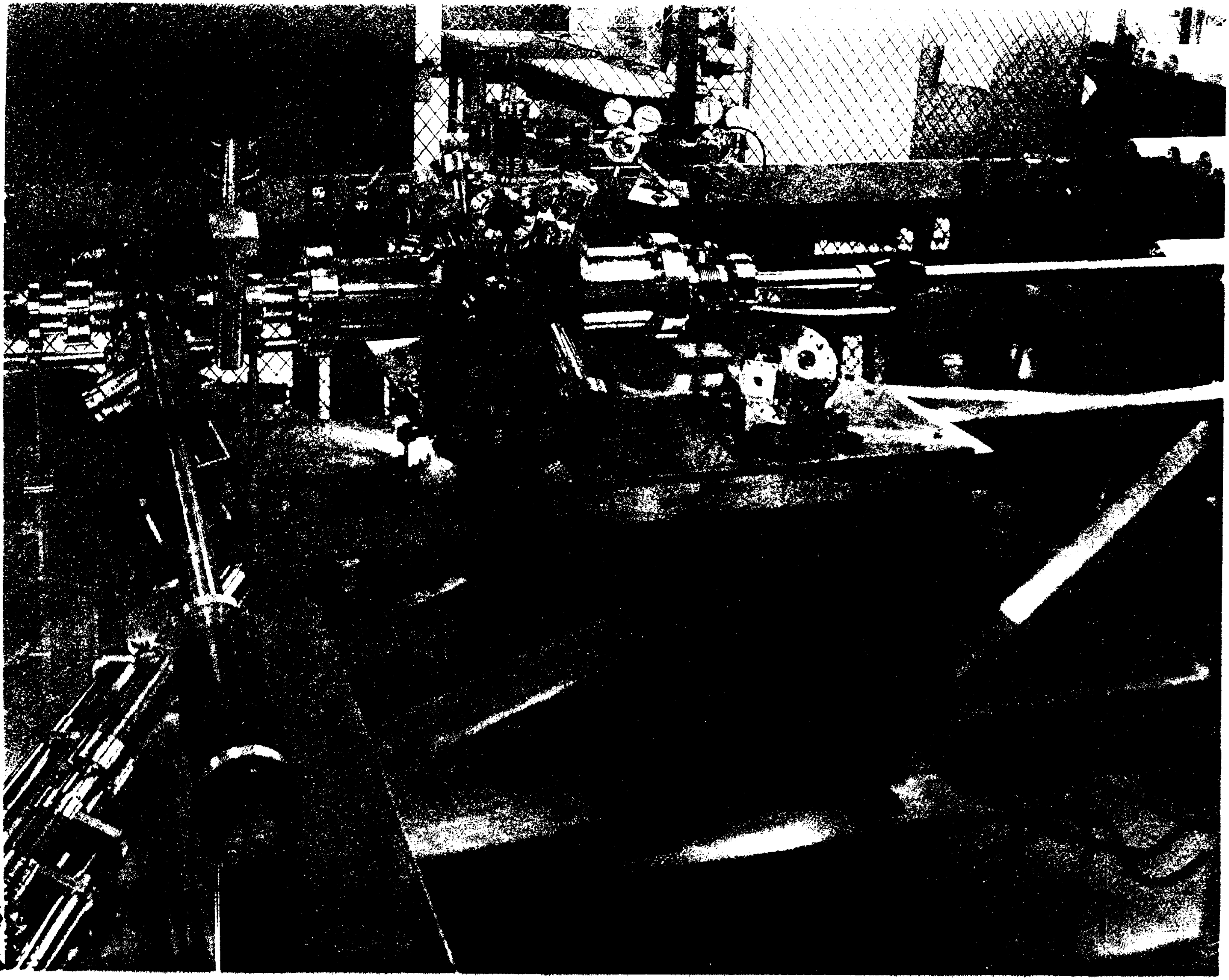
Cs_2Te PHOTO-CATHODES: UPDATE

- UNLIKE TTFL CASE, SYSTEM INSTALLED BY INFN-MILANO AT FERMILAB HAS CATHODE PREP CHAMBER ATTACHED PERMANENTLY TO RF GUN.
- 2 CATHODES COATED & USED SO FAR.
- MEASURE DC QE WITH UV LAMP & PICO-AMMETER; CAN SCAN UV SPOT TO GET QE vs. (x, y).
- MEASURE PULSED QE WITH CATHODE IN RF GUN VIA LASER & ICT.



Cs_2Te COATINGS

10 min Te DEPOSITED

1st CATHODE: Cs DEPOSITED FOR 63 min, ORANGE (MAR '97)

2nd CATHODE: Cs DEPOSITED FOR 110 min, BLUE (AUG '97)

2nd CATHODE

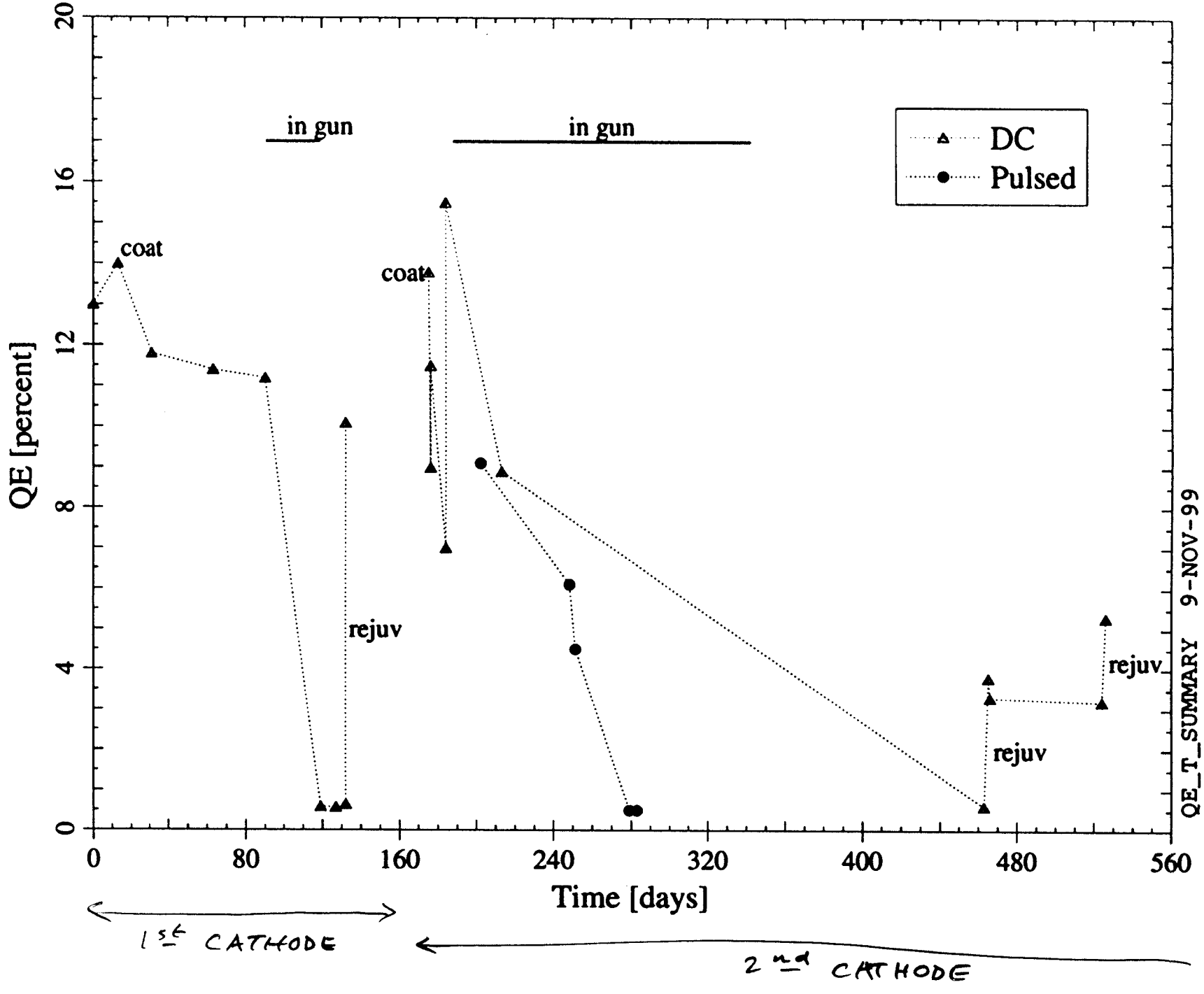
USED IN GUN A (SEP '97 TO DEC '97)

REJUVENATED TWICE (JUN '98, AUG '98)

USED IN GUN 3 (SEP '98 TO OCT '98)

USED IN GUN 4 (MAR '99 TO PRESENT)

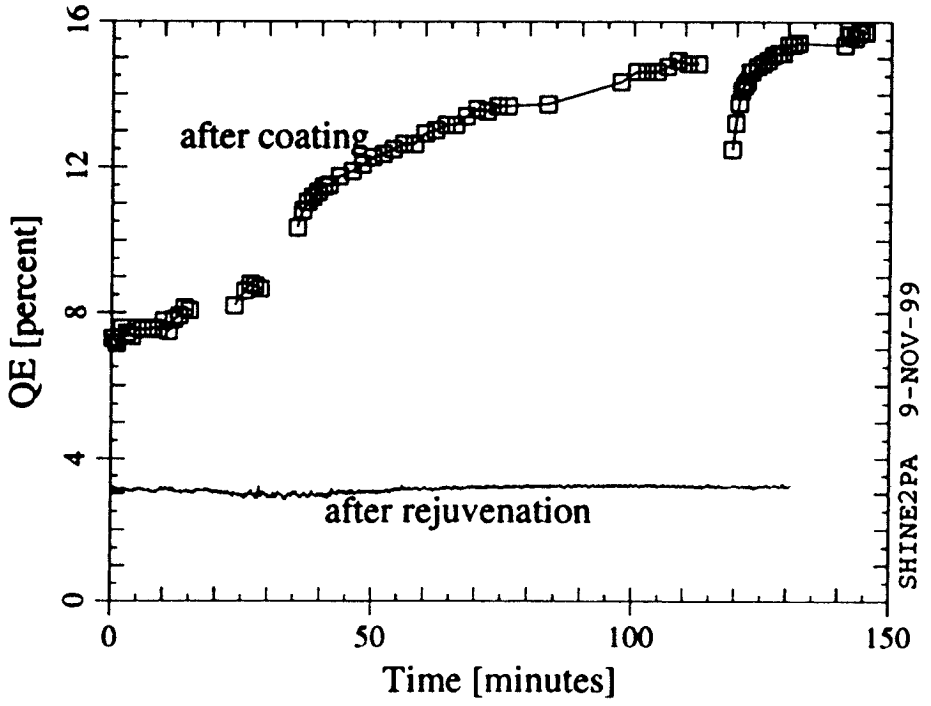
EARLY HISTORY OF QE (GUN A)

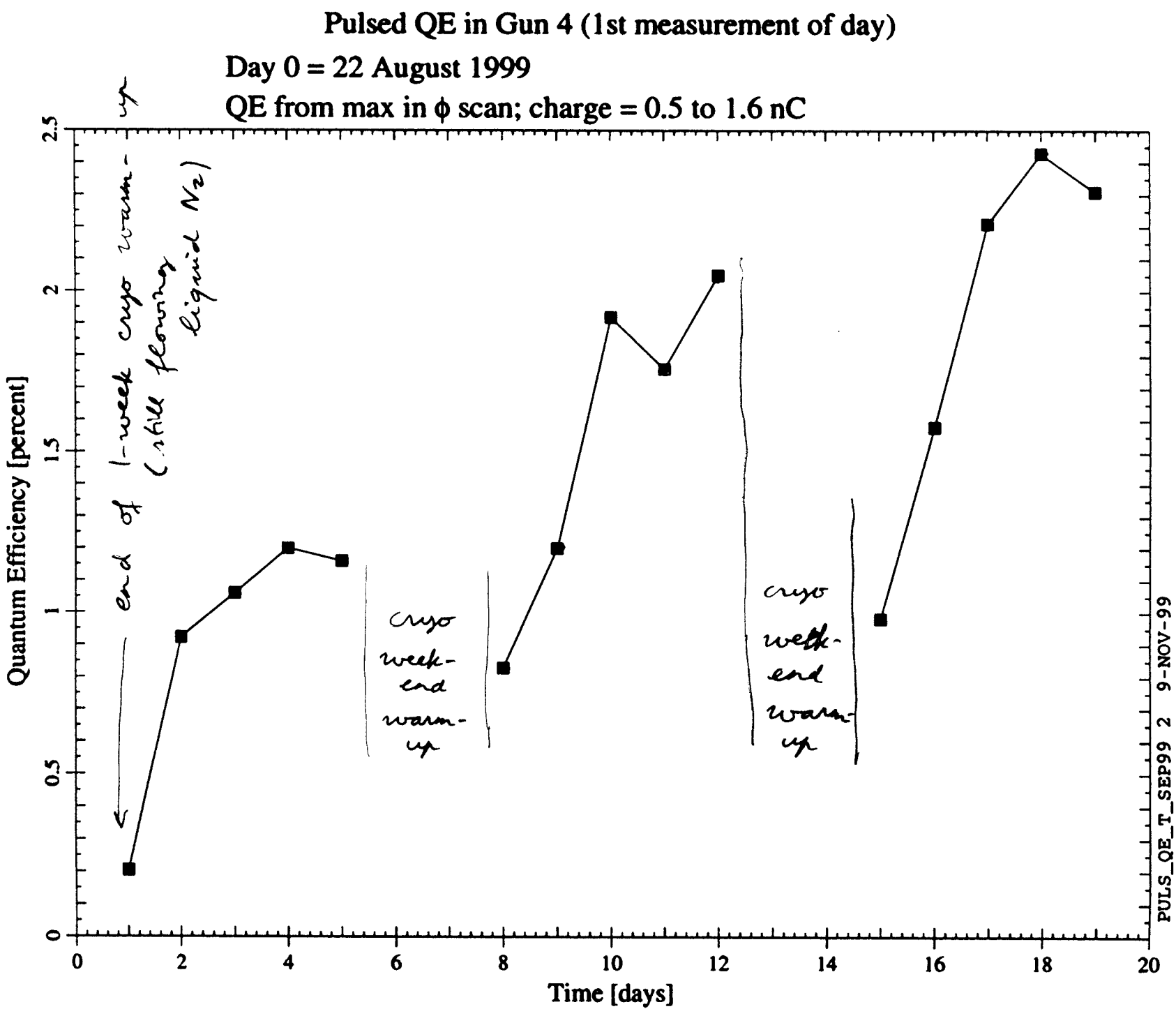


MUTABILITY OF 2nd CATHODE

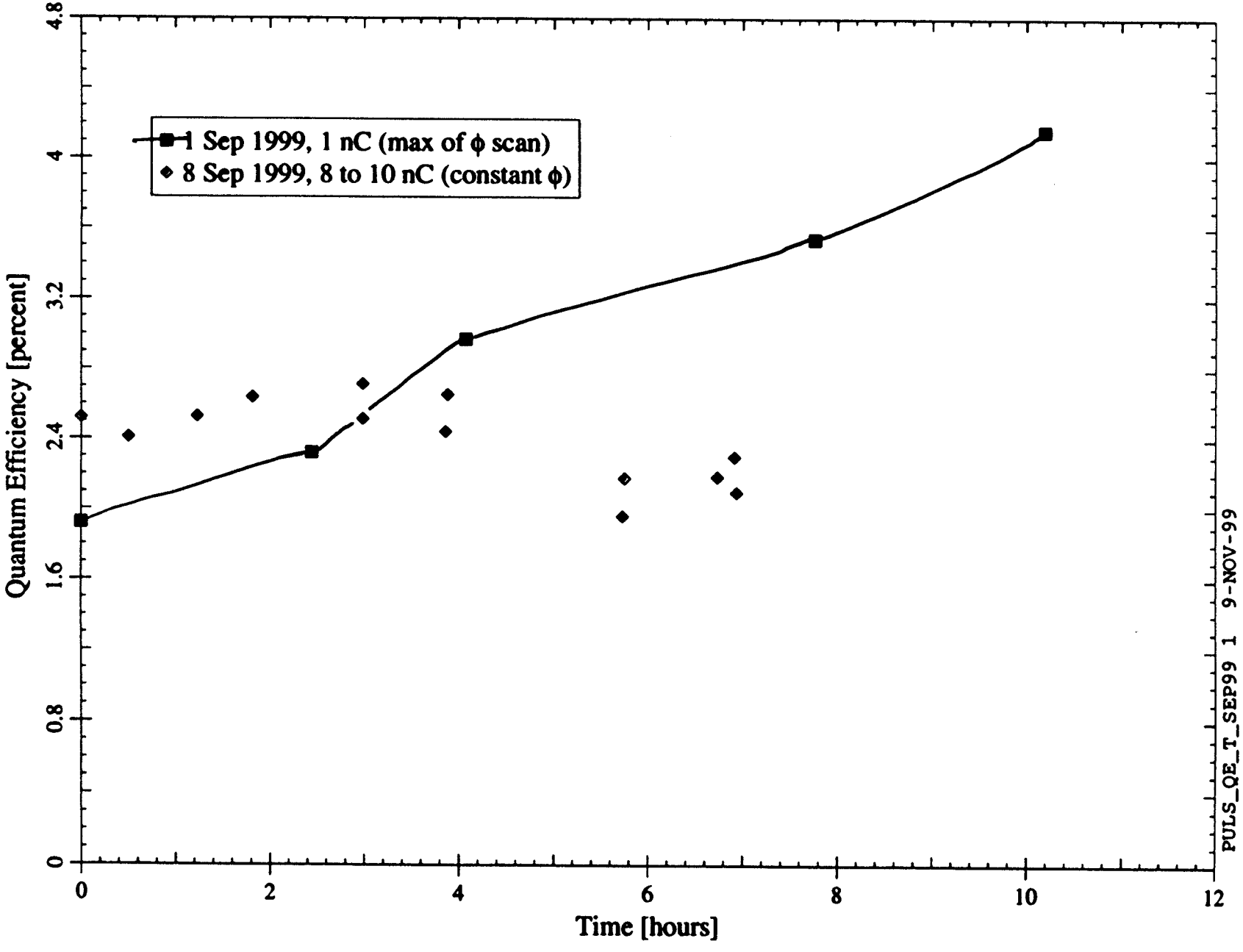
- RIGHT AFTER COATING OF 2nd CATHODE, SAW INCREASES IN QE WITH LIGHT FROM UV LAMP AT ROOM TEMPERATURE.
- QE WAS MORE STABLE AFTER REJUVENATION.
- RECENT OPERATION WITH GUN 4: SEE VARIATION IN QE OVER LONG TIMES. MAY BE CORRELATED WITH EXPOSURE TO UV LASER LIGHT AND EXPOSURE TO RESIDUAL GAS. VACUUM IN GUN DEPENDS ON TEMP OF CAPTURE CAVITY (CRYO PUMP AT 1.8K, BURPS GAS WHEN WARMING UP).

DC QE vs. t FOR 2nd CATHODE




Pulsed QE in Gun 4 (1st measurement of day)
Day 0 = 22 August 1999
QE from max in ϕ scan; charge = 0.5 to 1.6 nC
end of 1-week cryo warm-up (while flowing liquid N2)
cryo weekend warm-up
cryo weekend warm-up
Quantum Efficiency [percent]
Time [days]
0
0.5
1
1.5
2
2.5
0
2
4
6
8
10
12
14
16
18
20
PULS_QE_T_SEP99 2 9-NOV-99

Pulsed QE Measurement in Gun 4



CONCLUSIONS

- CATHODES LAST LONGER THAN EXPECTED : PRESENT CATHODE WAS COATED 2 YEARS AGO.
- PRESENT CATHODE'S QE VARIES WITH TIME WHILE IN THE RF GUN. NOT YET UNDERSTOOD IN DETAIL.
- SPATIAL UNIFORMITY OF QE: MAYBE ROOM FOR IMPROVEMENT.