LAL Involvement in PHIN

- Principal objective – design and construct RF gun suited to needs of CTF-3.

- 2nd objective – install photo-injector test stand within the **NEPAL** laboratory at Orsay.

Strategy : Allow RF gun tests (at Orsay) to proceed in parallel with drive beam studies (at CERN).

c.f. TTF / NICAD

A Radio-frequency gun for CTF-3

Specifications (CERN/PS 2002-008)

RF Frequency	2.99855 GHz
Nominal power	30 MW
Beam energy	5 ~ 6 MeV
Beam current	3.5 A
Q_0	13000
Repetition frequency	5 Hz
Coupling factor	~ 3
E_{cath}	85 MV/m

General considerations of importance (H. Braun, G. Geschonke, G. Suberlucq)

- symmetric coupling → beam kicks,
- avoid tuning plungers → complicate design,
- good dynamic vacuum pressure → cathode life-time,
- design should be compatible with existing cathode installation scheme,
- need optical matching to downstream sections.

Take inspiration from previous gun designs (CTF-2).

The NEPAL Test Stand

(Nouvelles Expériences en Physique des Accélérateurs Linéaire)

- Originally built to test High Gradient S-band structures

  35 MW, 4.5 μs pulsed modulator / klystron ensemble,
  (150 MW, 0.6 μs in pulse compression mode)

- Re-converted for tests of super-conducting cavities in pulsed mode (October 1996 – January 2000).

Test stand has essentially been in abeyance since then.

Power source promised 'on loan' to the Institute de Physique Nucléaire – Orsay for the **ALTO** project for use with the LEP Injector Linac structures.

LAL will inherit 'new' 20 MW klystron from the Super-ACO injector linac (to be closed at the end of 2003).
Modulator more problematic (security issue).
Build new modulator ?

Cannot test and condition CTF-3 gun to full power !

LAL experience in RF Gun Technology

- CANDELA – 1-1/2 'de-coupled' cells. Metallic cathodes.

- ELYSE – pulsed radiolysis facility. Gun based on CTF experience.
  Cs_2Te photo-cathodes.

Both guns '*single shot*' as opposed to pulse train needed for CTF-3 !

Large beam power flow is most notable difference.

Principal tasks for the LAL group

- Design and construction of guns
- Installation of beam line
- Commissioning of commercial laser
- Construction of photo-cathode Preparation Chamber (ELYSE like)

CARE project funds available from January 2004. LAL project group to be organised during month of October.