



Liquid lead target test at ATF Linac End

Present members :

KEK: J.Urakawa, T.Omori, T.Suwada, T.Kamitani, ---

BINP , Novosibirsk : Pavel Logachev (BINP), V.M.Strakhovenko, ---

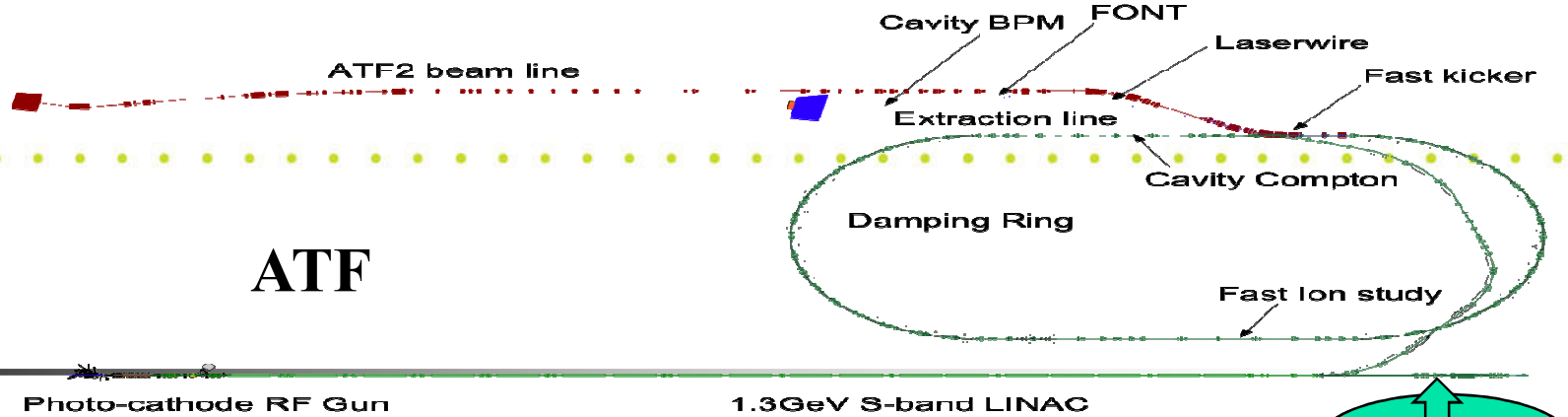
Hiroshima: T.Takahashi, M.Kuriki, ---

IPNL: X.Artru, R.Chehab, M.Chevallier, ---

LAL: A.Variola, O.Dadoun, ---

CERN: L. Rinolfi, A. Vivoli, F. Zimmermann, ---

Osaka University: S. Kashiwagi, G. Isoyama, ---

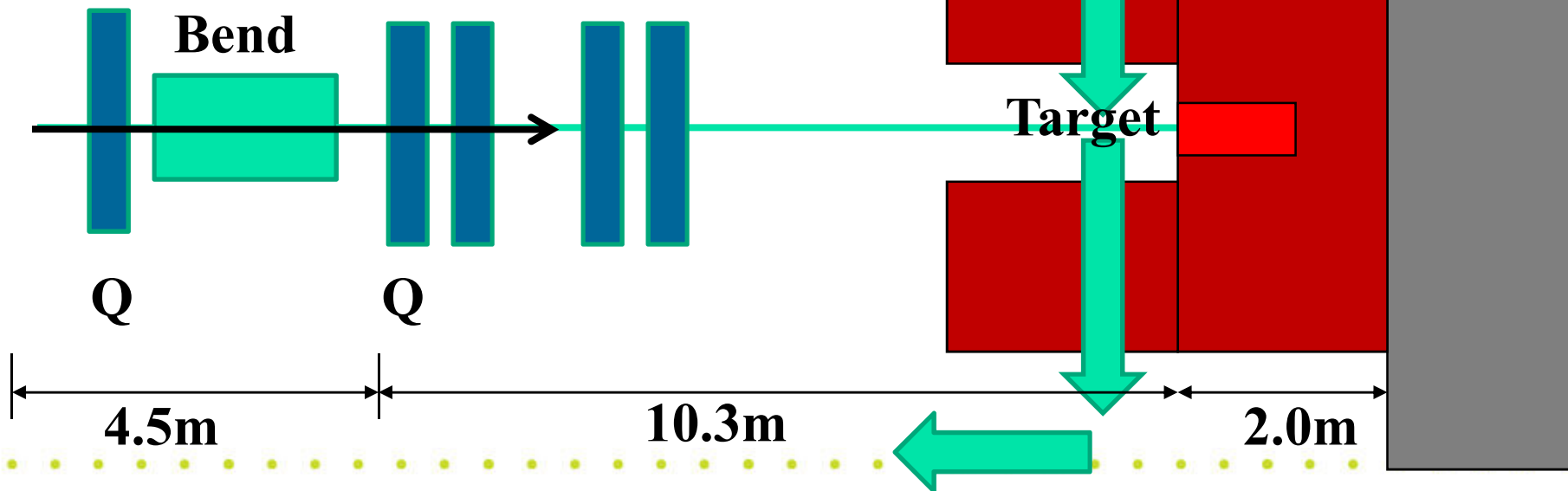


ATF

Here

We decided to do the beam experiment with BINP prototype liquid lead target.

Liquid lead 300°C





ATF Linac Beam Parameters

β function tuning range : 0.1m to 10m

Bunch structure : 1 to 20 bunches/train

Bunch charge : 0.5 to 2.0×10^{10} electrons/bunch

Beam energy : 1.3GeV

Repetition rate : 0.7 to 6.25Hz

Usual normalized emittance : 10π mmrad

Beam size : 0.2 to 2.0mm

Energy density on target

0.006 to 48×10^{10} GeV/mm²

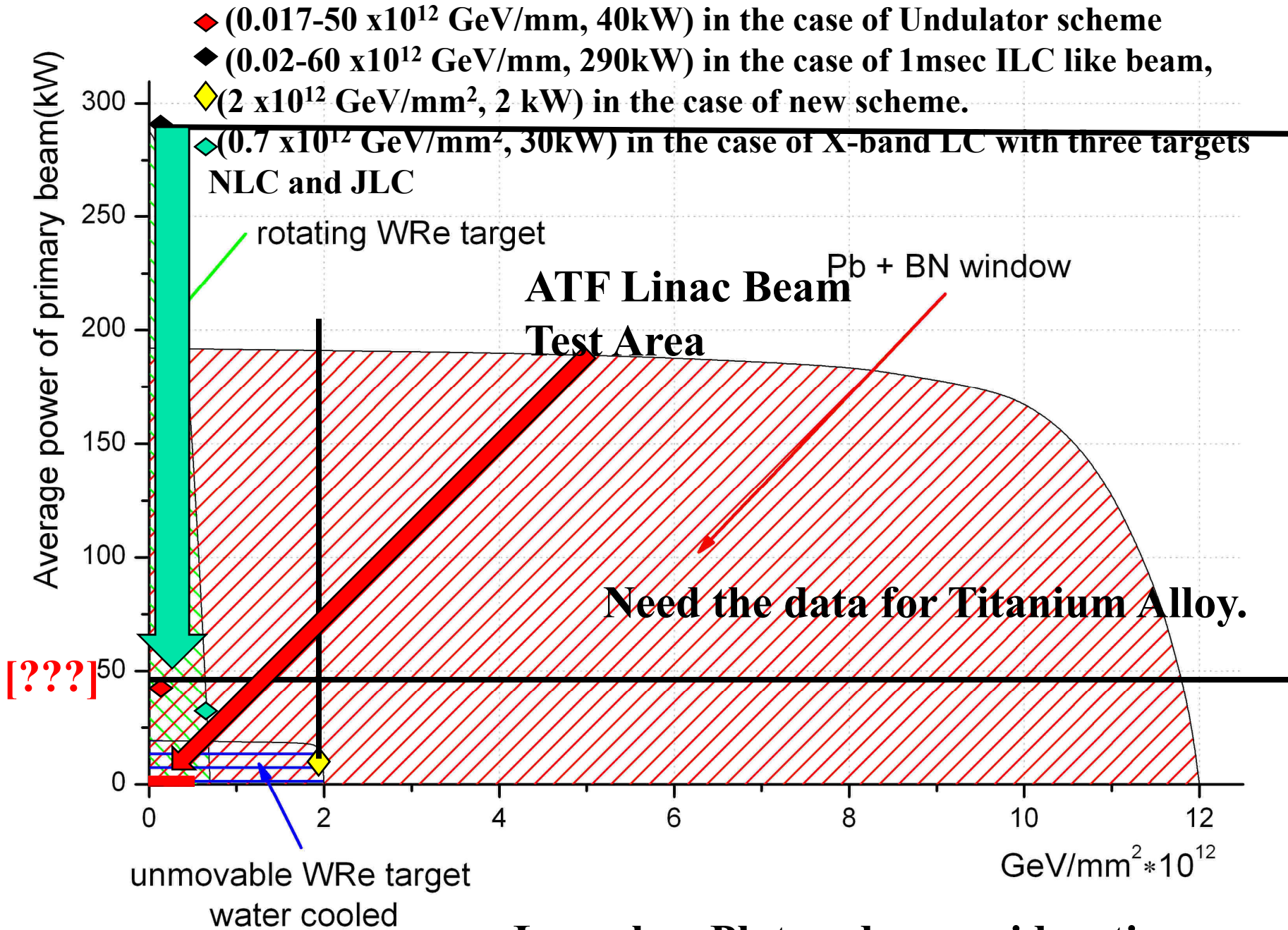
Power deposit on target

0.004 to 300×10^{10} GeV/mm² s

Acceptable beam rep. rate?

What is meaningful
beam experiments for
ILC liquid target?

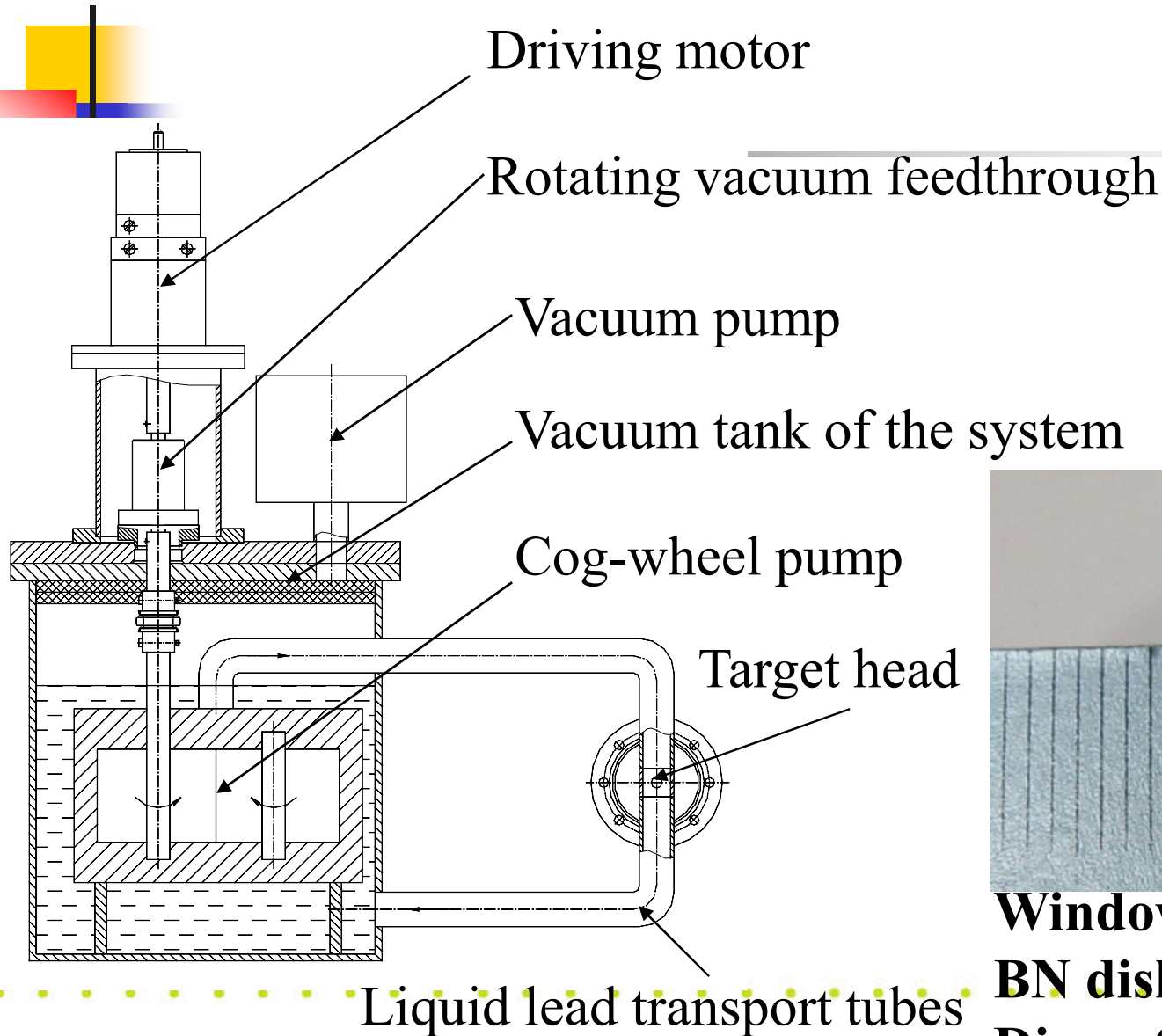
This is under discussion.



Logachev Plot under consideration



System of the prototype of liquid lead positron production target.



Window thickness 4mm
BN disks for windows
Diameter 12mm



Liquid lead jet in vacuum

Cog-wheel pump test bench is in continuous run
(20000 h) with liquid lead jet. 90% Pb, 10% Sn alloy at 300°C.

Necessary measurements and check items.

Window temperature rise on front side and rear side.

Flow turbulence of liquid lead by magnetic field.

Pressure by beam (mechanical movement of window).

Confirm Logachev Plot or check the interpretation.

Necessary experience and broken threshold of window

**Cavitation, treatment of liquid lead ; need the prototype.
Import tentatively it from BINP in this summer, then we
learn how to treat the liquid lead target.**

Breaking BN window; need KEKB ring beam.



Window Issues : Broken by acoustic shock wave or thermal effects (temperature rise)

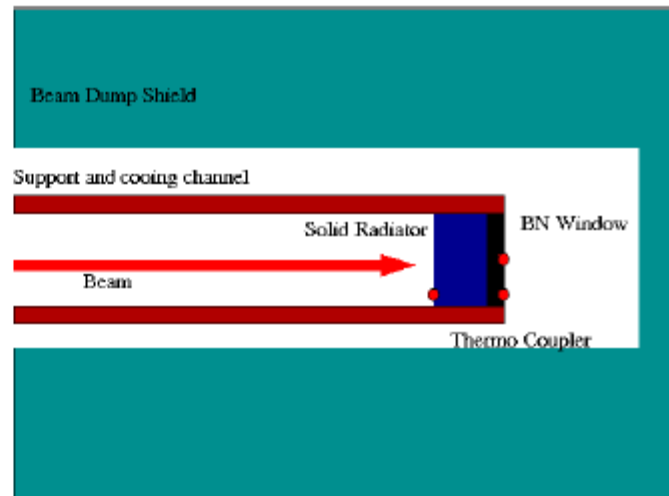
New target system: Liquid Lead Target System

(90% Pb, 10% (mass) Sn alloy, 300°C)

Window Candidates : BN, BC, Be, ---

- ▶ Space is very limited for KEKB BD.
- ▶ Solid Radiator is placed before BN plate.
- ▶ The sample is fixed with support rod, which also acts as cooling channel.
- ▶ It is difficult to place any equipments other than TC?

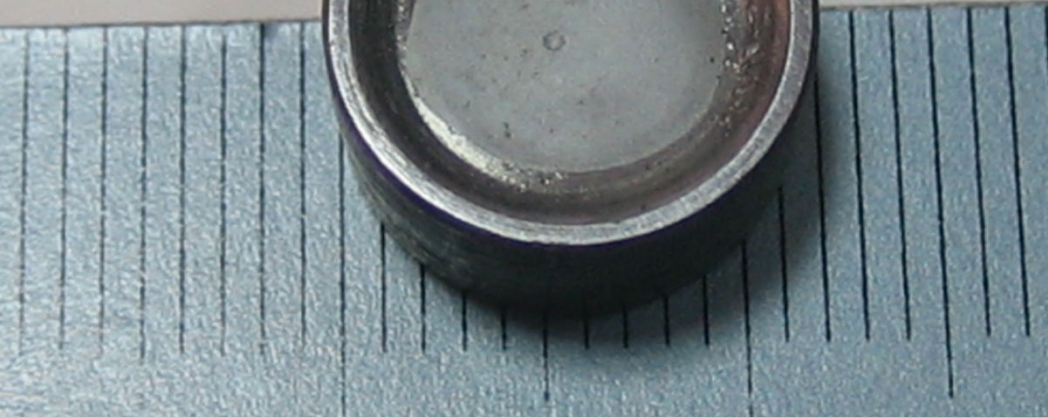
KEKB Beam Dump Setup



BINP requested the windows test with KEKB beam. However, we kek decide this test is pending. Maybe, we do not do this.

Window thickness 4mm

BN disks for windows



Test samples after 1000 h exposition
in liquid lead alloy at 300°C
(no any damage of brazing joint).

Systematic experimental studies on Liquid 90%Pb+10%Sn target system with BN window will **start from late 2009.**

We are still discussing what kind of measurements are necessary for ILC target system and detail schedule.

To learn the operation of this liquid target is important for the evaluation of the reliability and the maintainability and we can propose very reliable target system for ILC e⁺ source with a lot of simulation and some proofs of experimental results.