R&D proposal for new target system including positron capture device in ILC positron source

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

What is new target system.

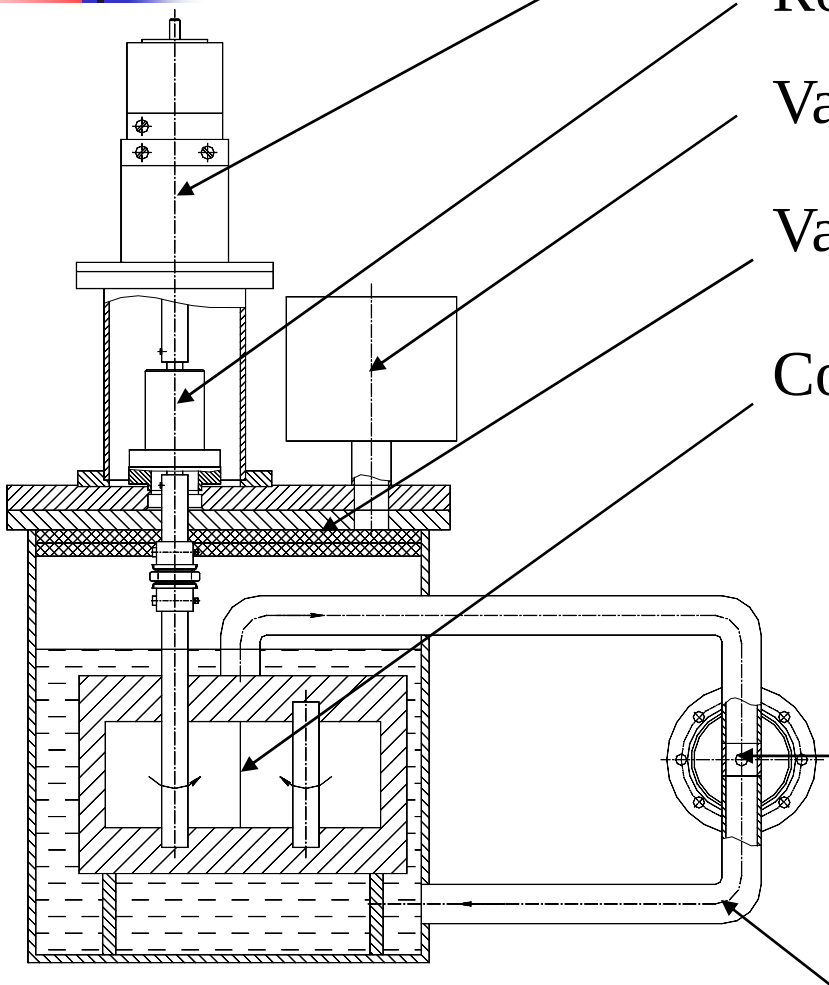
1. Liquid Lead Target System

(90% Pb, 10% (mass)Sn alloy, 300ºC)

2. Hybrid Target System

proposed by R.Chehab

Scheme of the prototype of liquid lead positron production target.



Driving motor

Rotating vacuum feedthrough

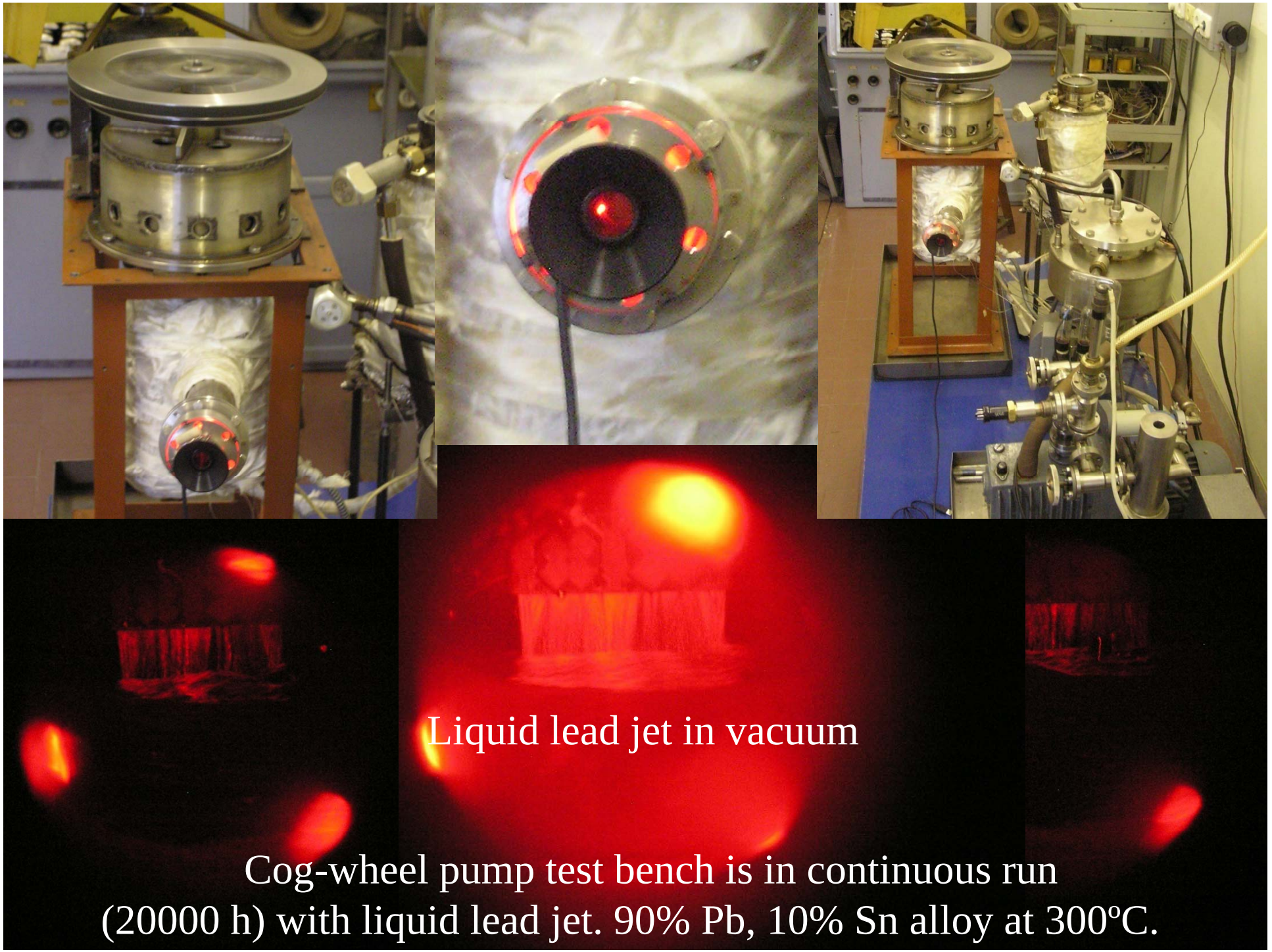
Vacuum pump

Vacuum tank of the system

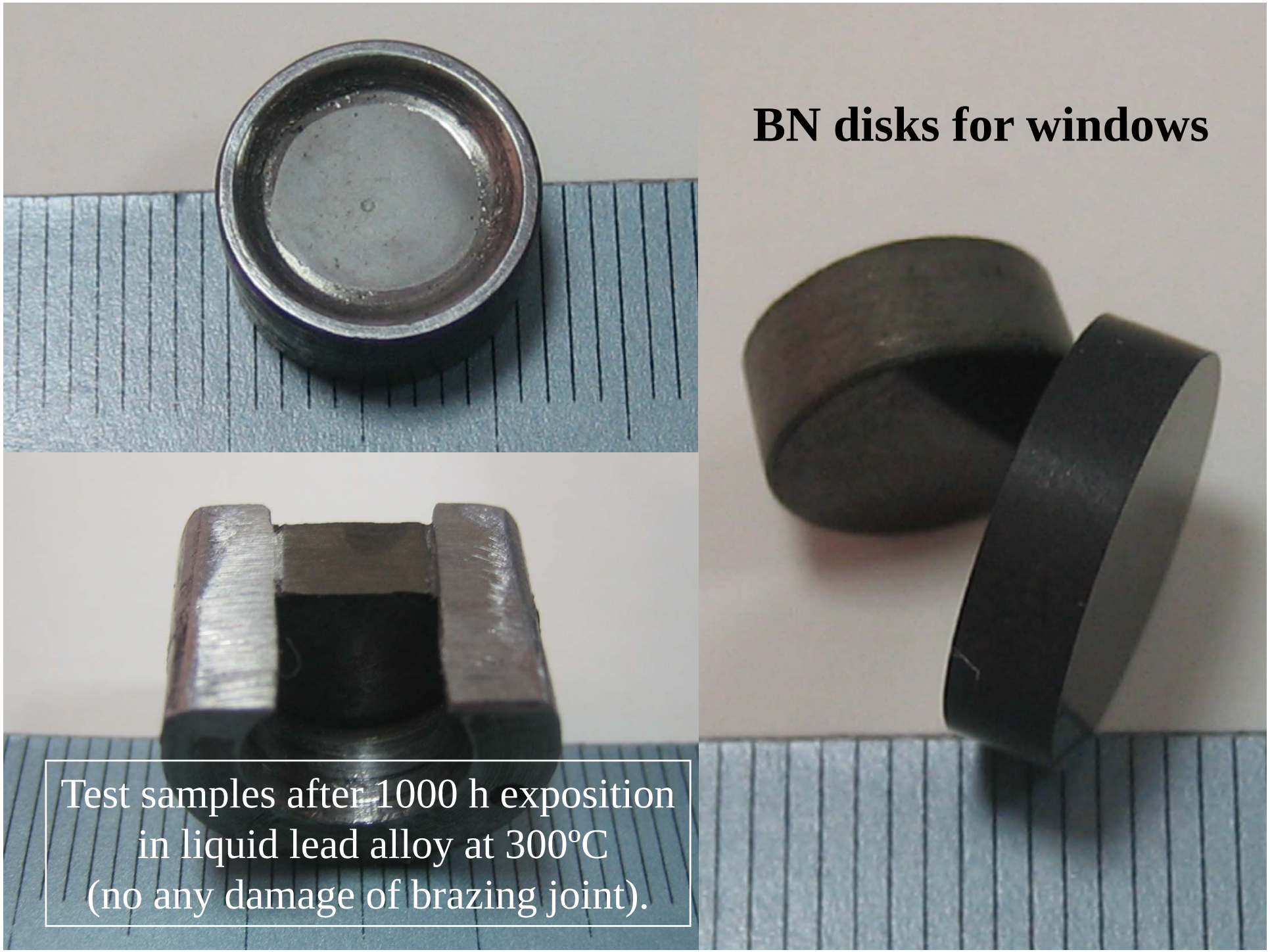
Cog-wheel pump

Target head

Liquid lead transport tubes



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

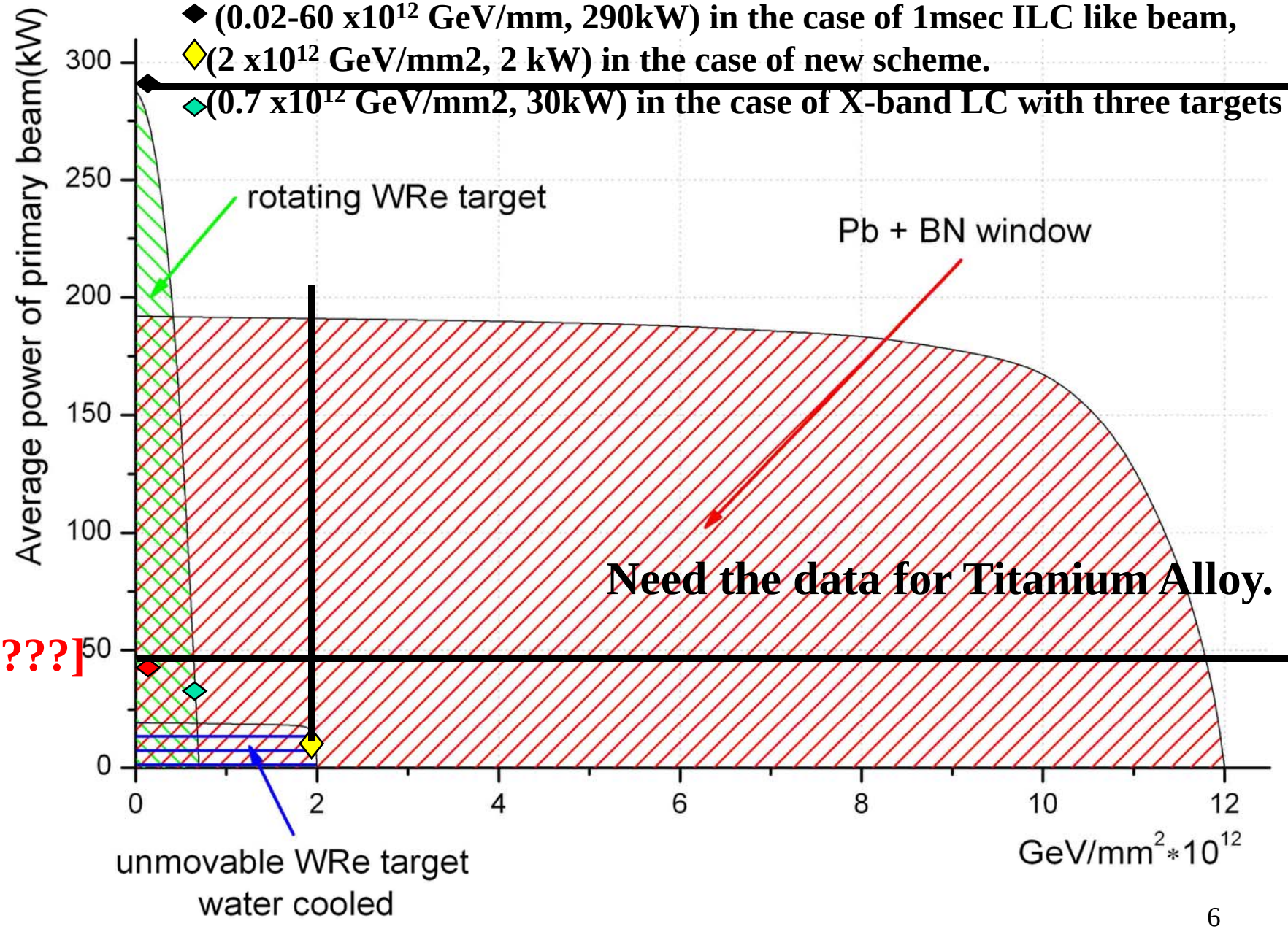

BN disks for windows
Test samples after 1000 h exposition
in liquid lead alloy at 300ºC
(no any damage of brazing joint).

◆ (0.017-50 x10^{12} GeV/mm, 40kW) in the case of Undulator scheme

◆ (0.02-60 x10^{12} GeV/mm, 290kW) in the case of 1msec ILC like beam,

◇ (2 x10^{12} GeV/mm2, 2 kW) in the case of new scheme.

◆ (0.7 x10^{12} GeV/mm2, 30kW) in the case of X-band LC with three targets



Need the data for Titanium Alloy.

[???]

Present status of our R&D proposal

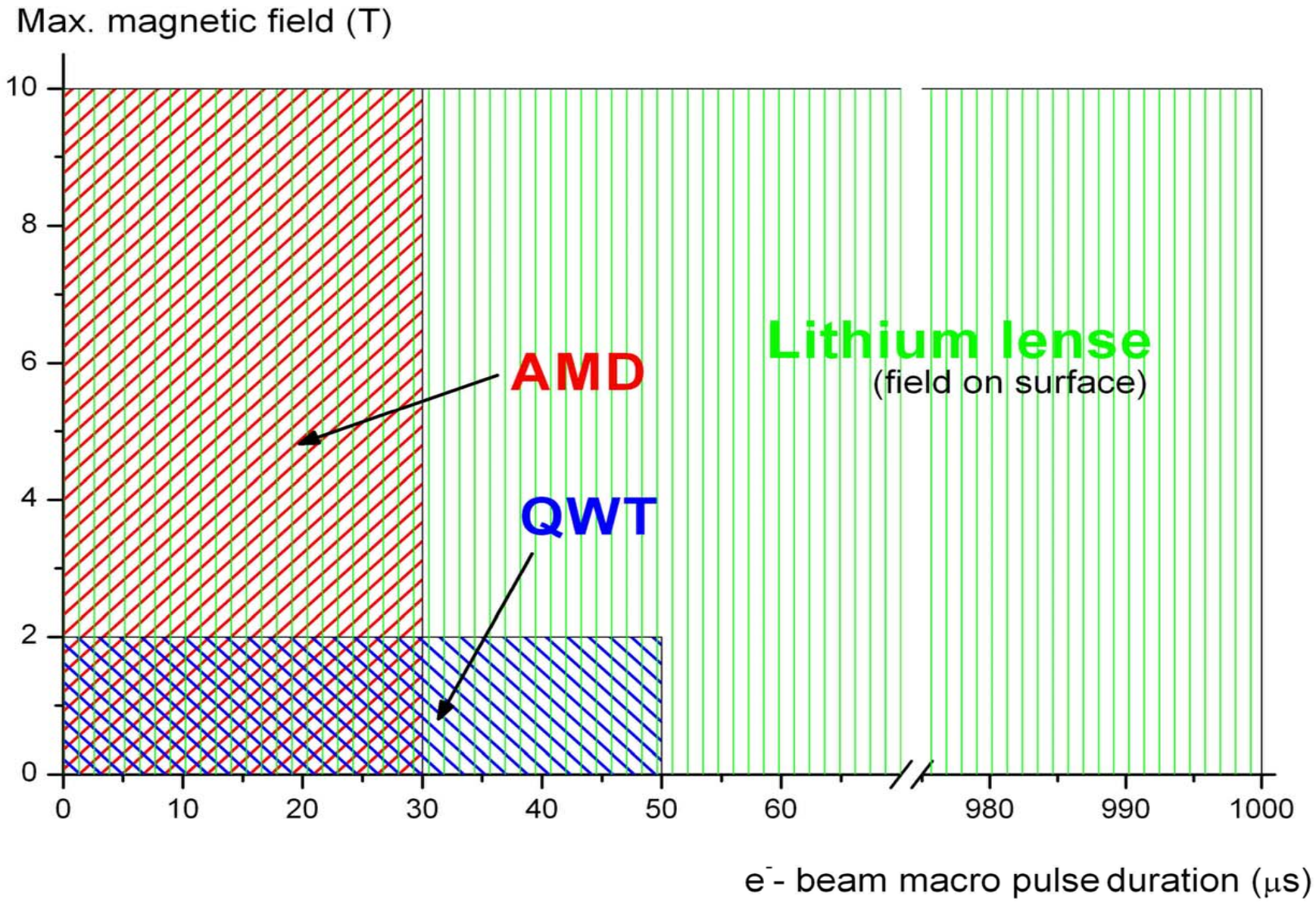
Two R&D plans to KEK were proposed by Osaka University and Hiroshima University, which are liquid Pb target with liquid Li lens and hybrid target R&D's.
KEK can support advanced accelerator R&D's which were proposed by Japanese Universities. Since total budget of this program is limited by about 2M$/year, KEK has to select good proposals for this program soon.
If KEK select our proposals, we can start our R&D with University students and staffs.

Advanced positron capture device

1. BINP Flux Concentrator magnet (FC)
This is ongoing with KEKB and BINP.

2. BINP Liquid Lithium Lens
Need a design work for ILC positron beam

by BINP.


Max. magnetic field (T)
10
8
6
4
2
0
AMD
QWT
Lithium lense
(field on surface)
0
10
20
30
40
50
60
980
990
1000
e- - beam macro pulse duration (μs)

R&D Schedule

1. BINP starts the manufacturing of windows (BN, BC and Be) for test at KEKB ring in 2009. (If I confirm the budget support, BINP can send them until April.)

2. Until early 2010, systematic experimental studies on Liquid 90%Pb+10%Sn target system with BN window and the hybrid target system.

3. ---