17TH ADVANCED BEAM DYNAMICS WORKSHOP ON

FUTURE LIGHT SOURCES

CVD Diamond Based XBPM for High-Power-Density X-ray Beams

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CVD Synthetic diamond properties

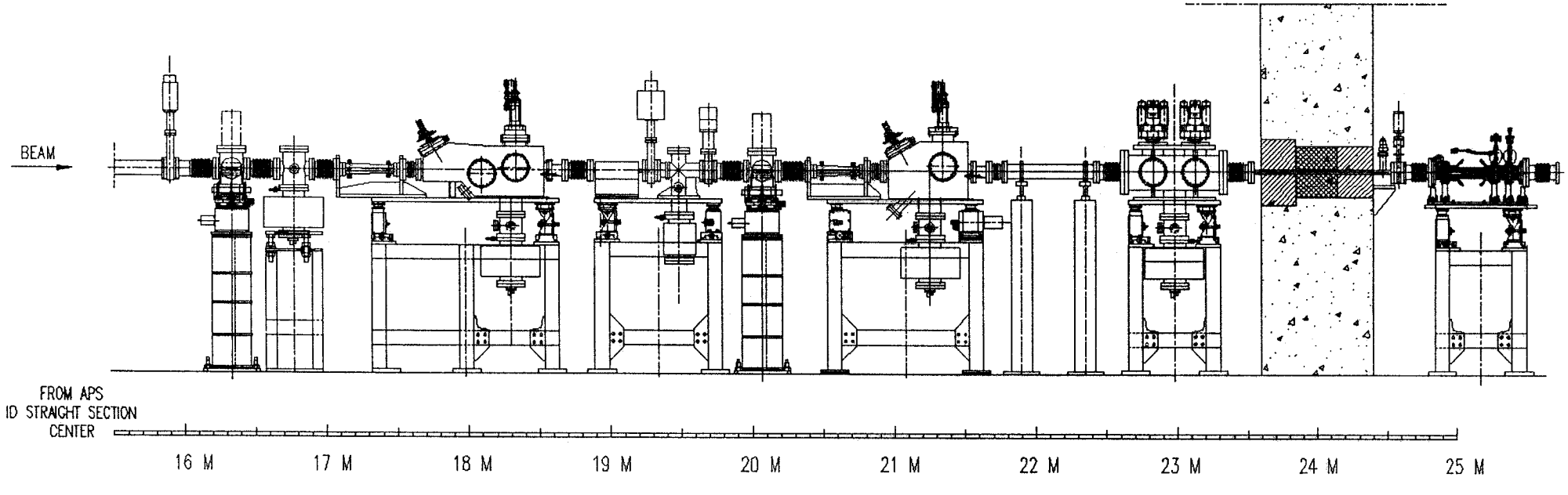
- High thermal conductivity
- Low thermal expansion coefficient
- Good mechanical strength and stiffness
- High radiation stiffness
- X-ray transparency
- 5.5-eV band gap

CVD Synthetic diamond applications at the APS

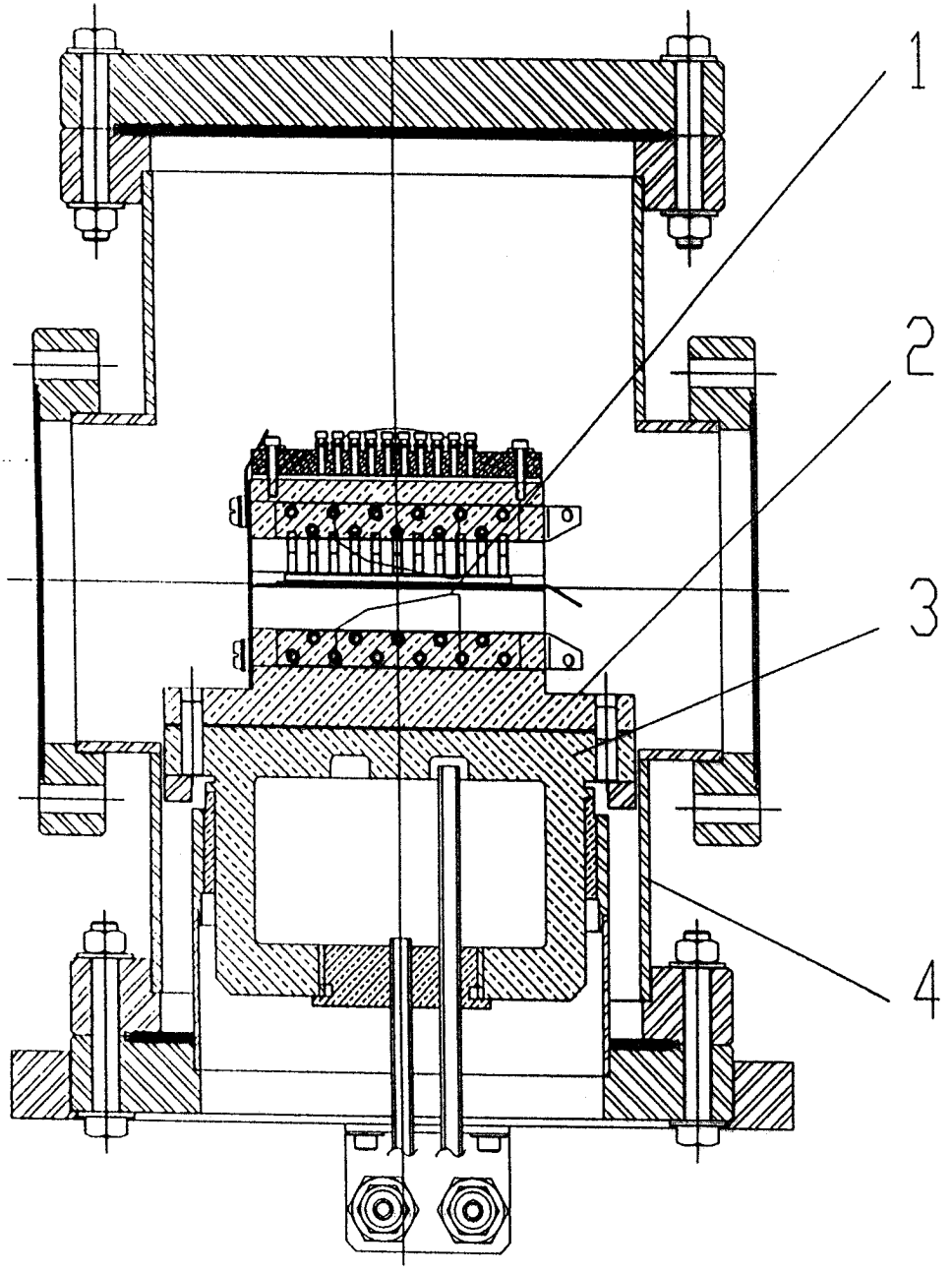
- Filters and windows for undulator beamline
- Blade material for undulator beamline front end XBPM
- Photoelectron-emission-type x-ray-transmitting XBPM
- PSPCD as x-ray-transmitting XBPM
- PSPCD as x-ray-transmitting x-ray beam profiler

CVD Synthetic diamond based XBPM study for 4^{th} generation LS

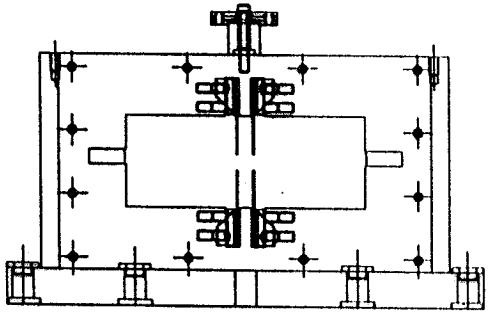
- Design optimization (photo-emission-type or PSPCD-type)
- Cooling structure for high peak power
- Integrated design with beamline front end components


BEAM
FROM APS
ID STRAIGHT SECTION
CENTER
16 M
17 M
18 M
19 M
20 M
21 M
22 M
23 M
24 M
25 M

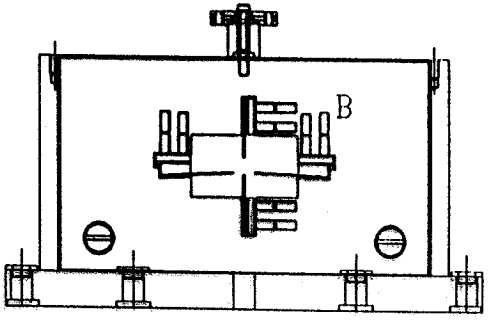
IDF7U



VIEW A UNDULATOR FE FIRST XBPM

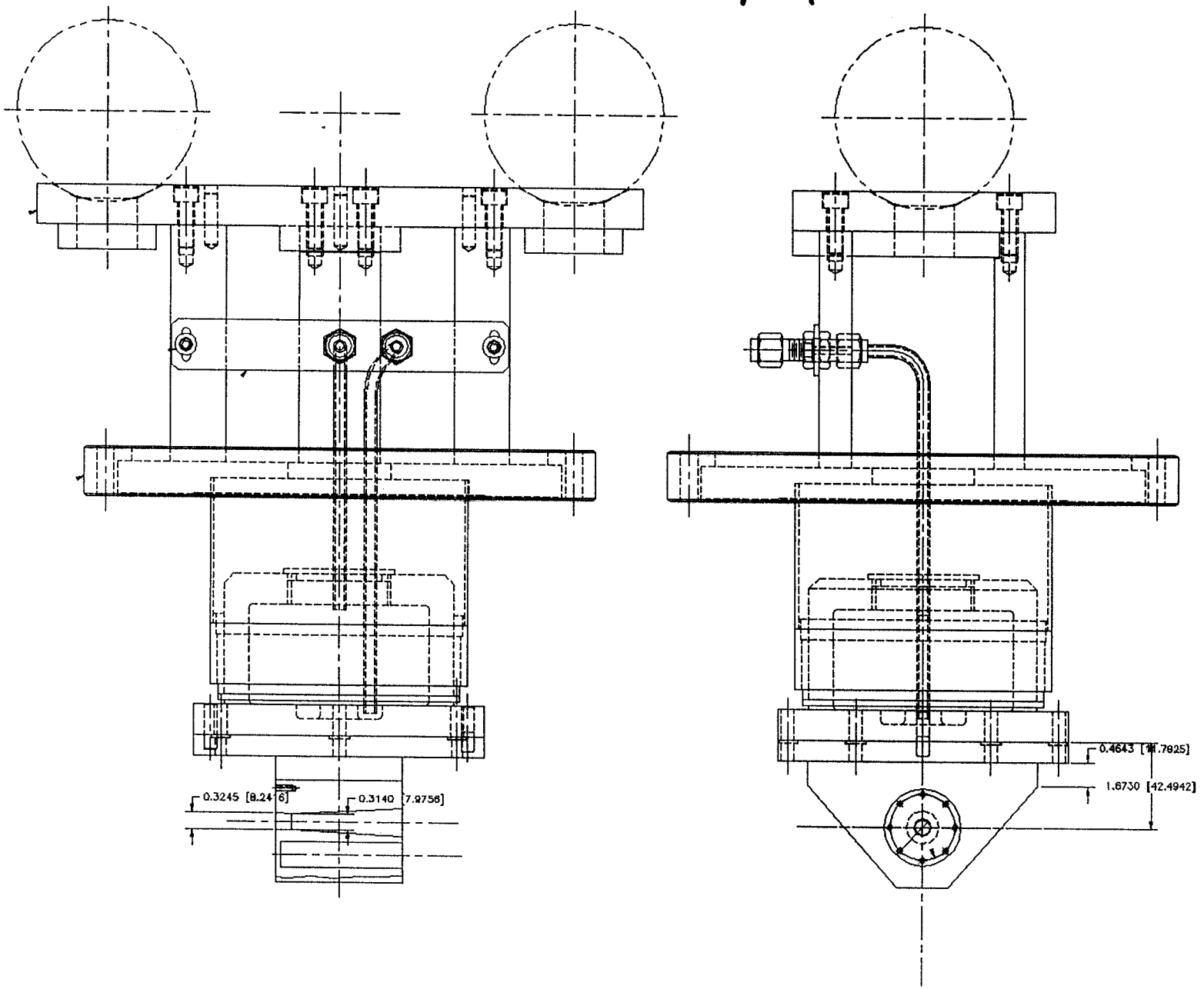


VIEW B UNDULATOR FE SECOND XBPM



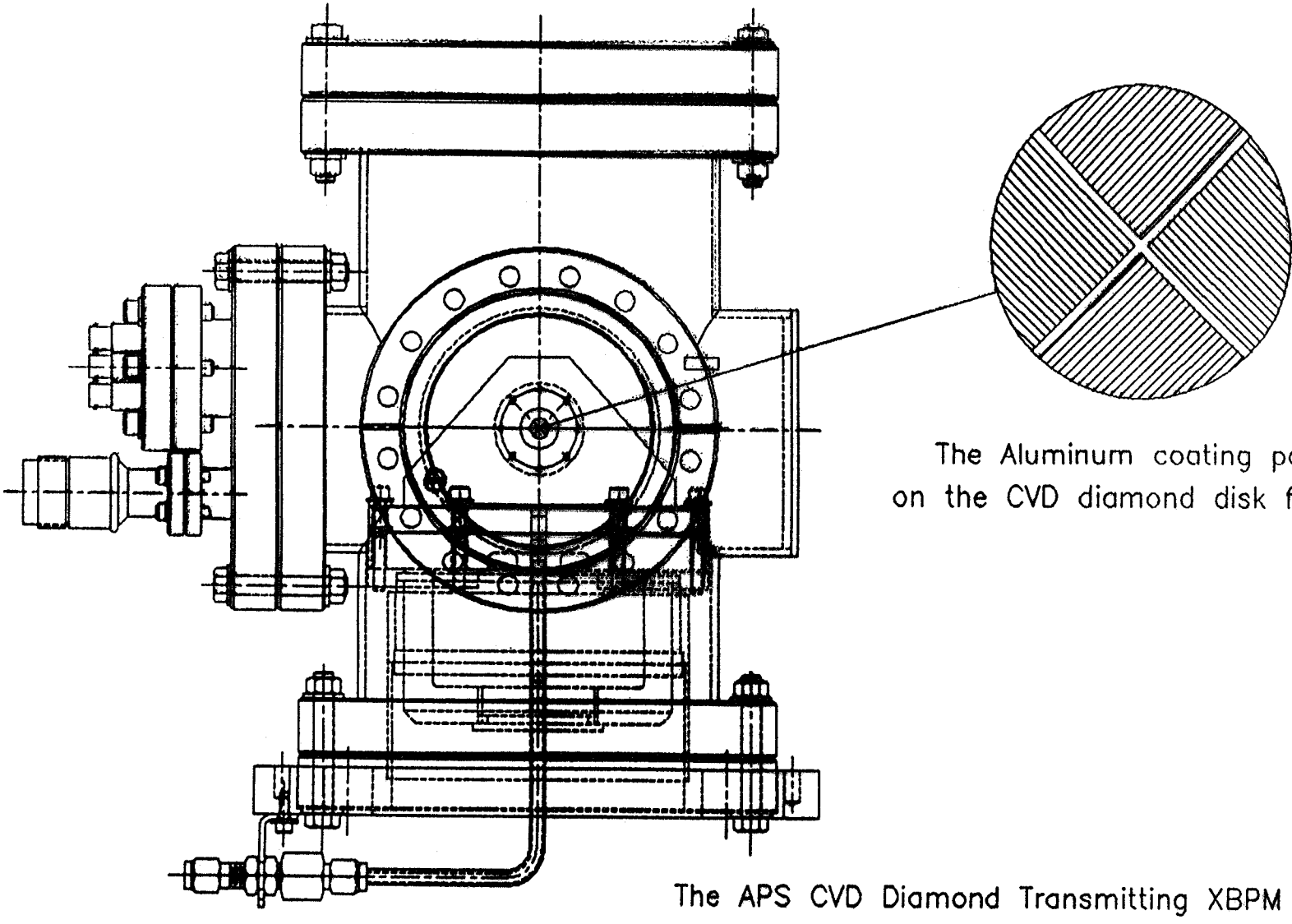
APS PSPCD @ ESRF BL-6

TBPM



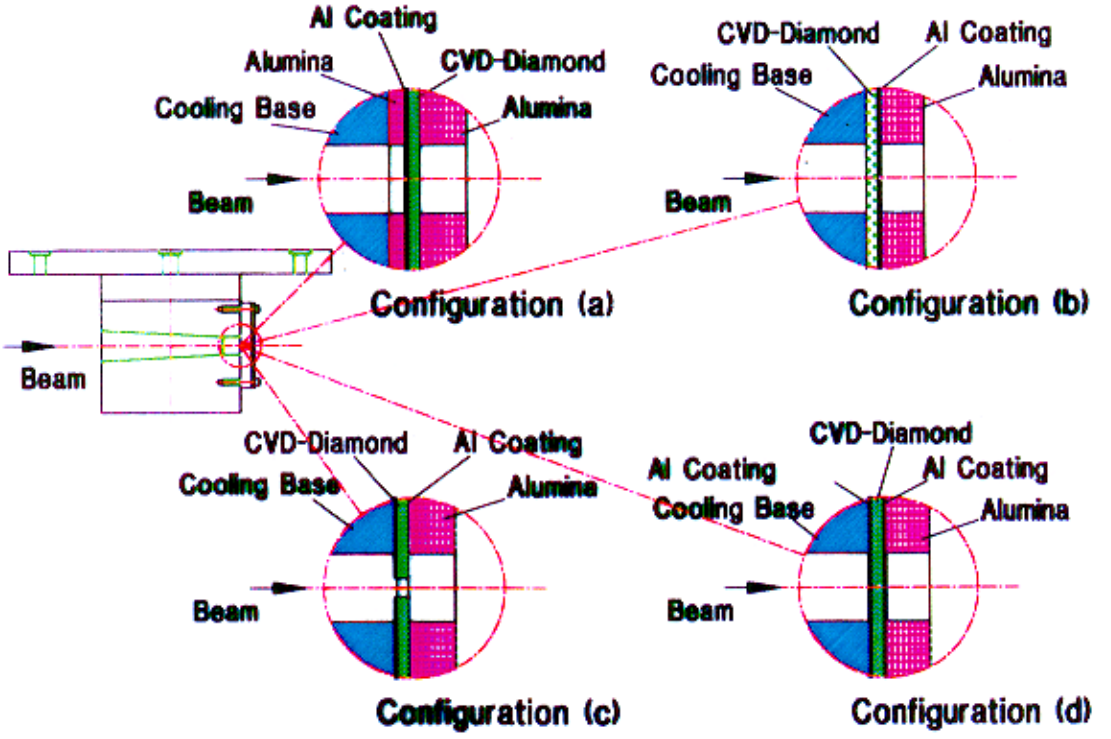
B4-20-980305-1.BMP

APS TBPM TEST AT ESRF

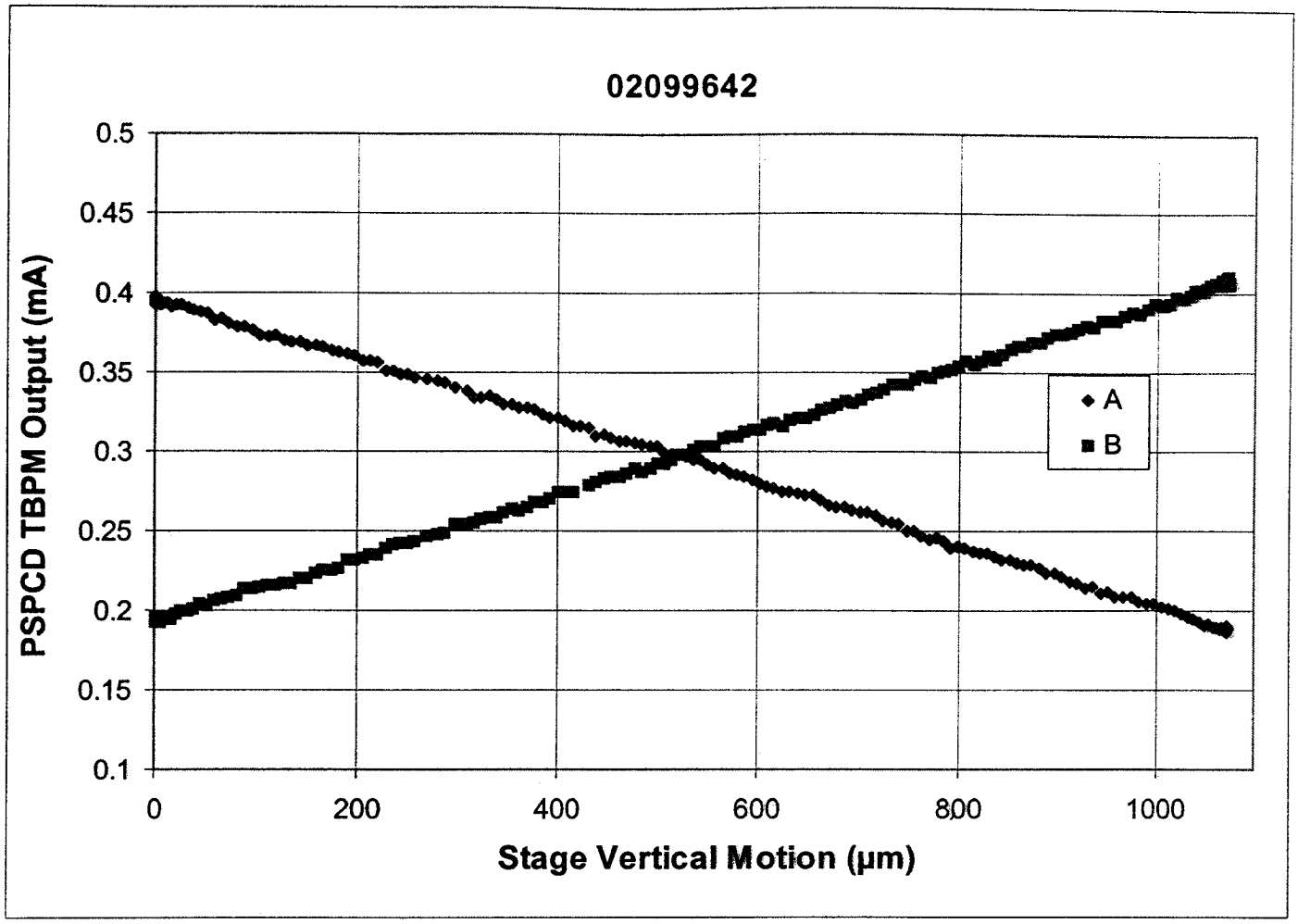


The Aluminum coating pattern
on the CVD diamond disk for TBPM

The APS CVD Diamond Transmitting XBPM (TBPM)
used in commissioning studies in 1-ID-A FOE



SAMPLE SET-UP CONFIGURATIONS FOR THE CVD-DIAMOND-BASED TRANSMITTING XBPM TEST AT THE APS AND ESRF



Output signal from a photoconductive-type TBPM test sample in configuration (d) as a function of the stage vertical motion. ID-6 undulator gap was 29-mm. ESRF storage ring current was 110-mA.

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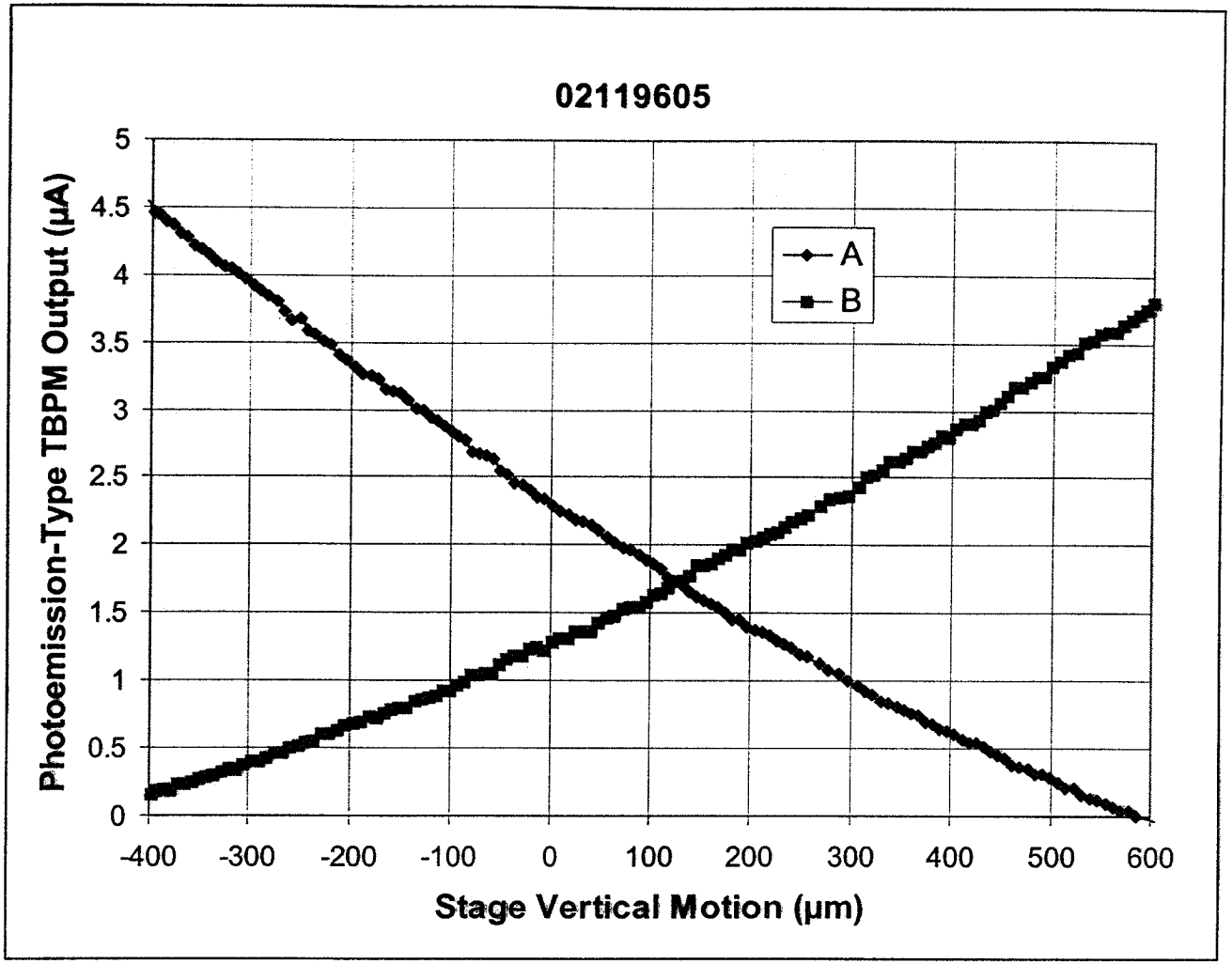
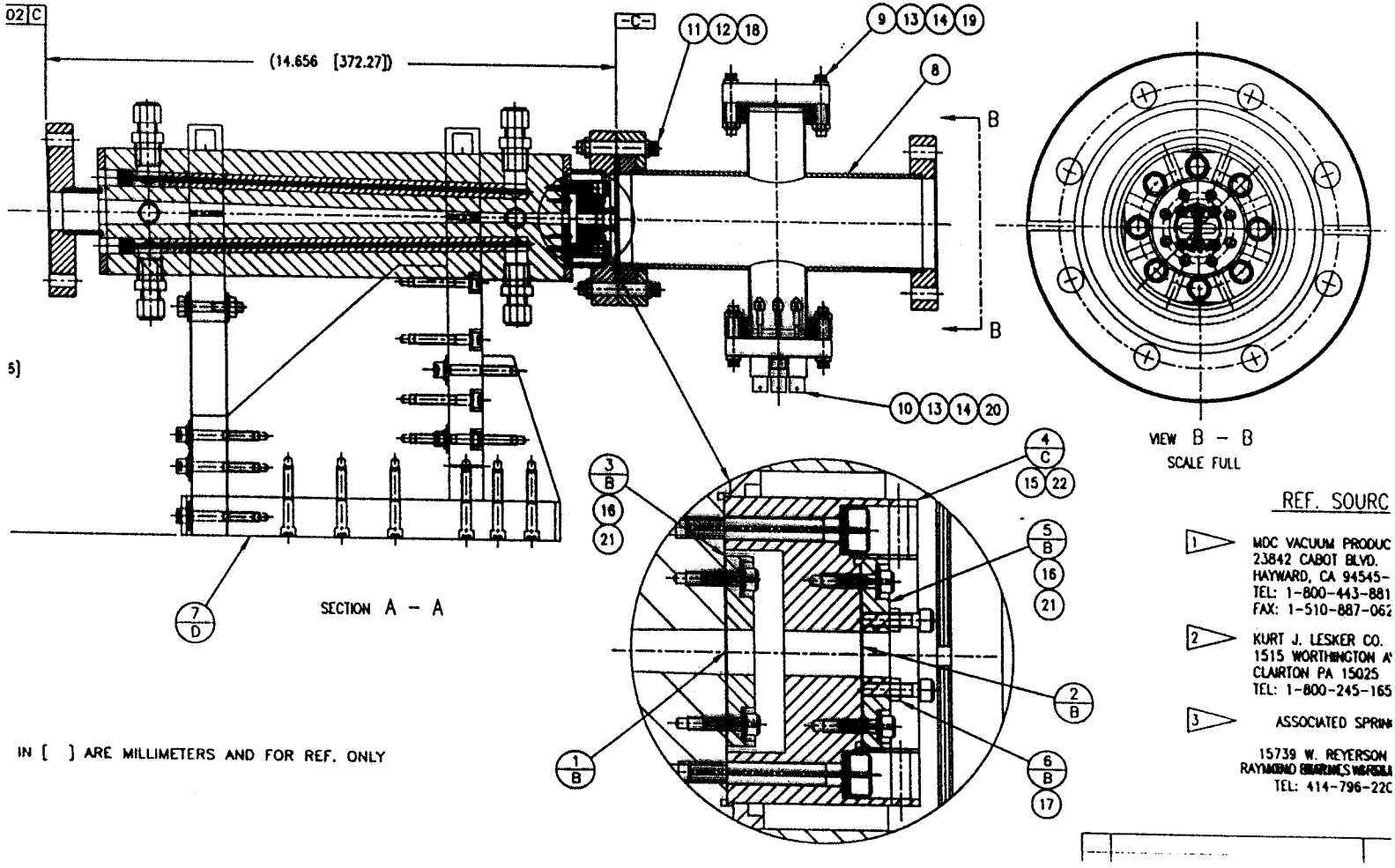
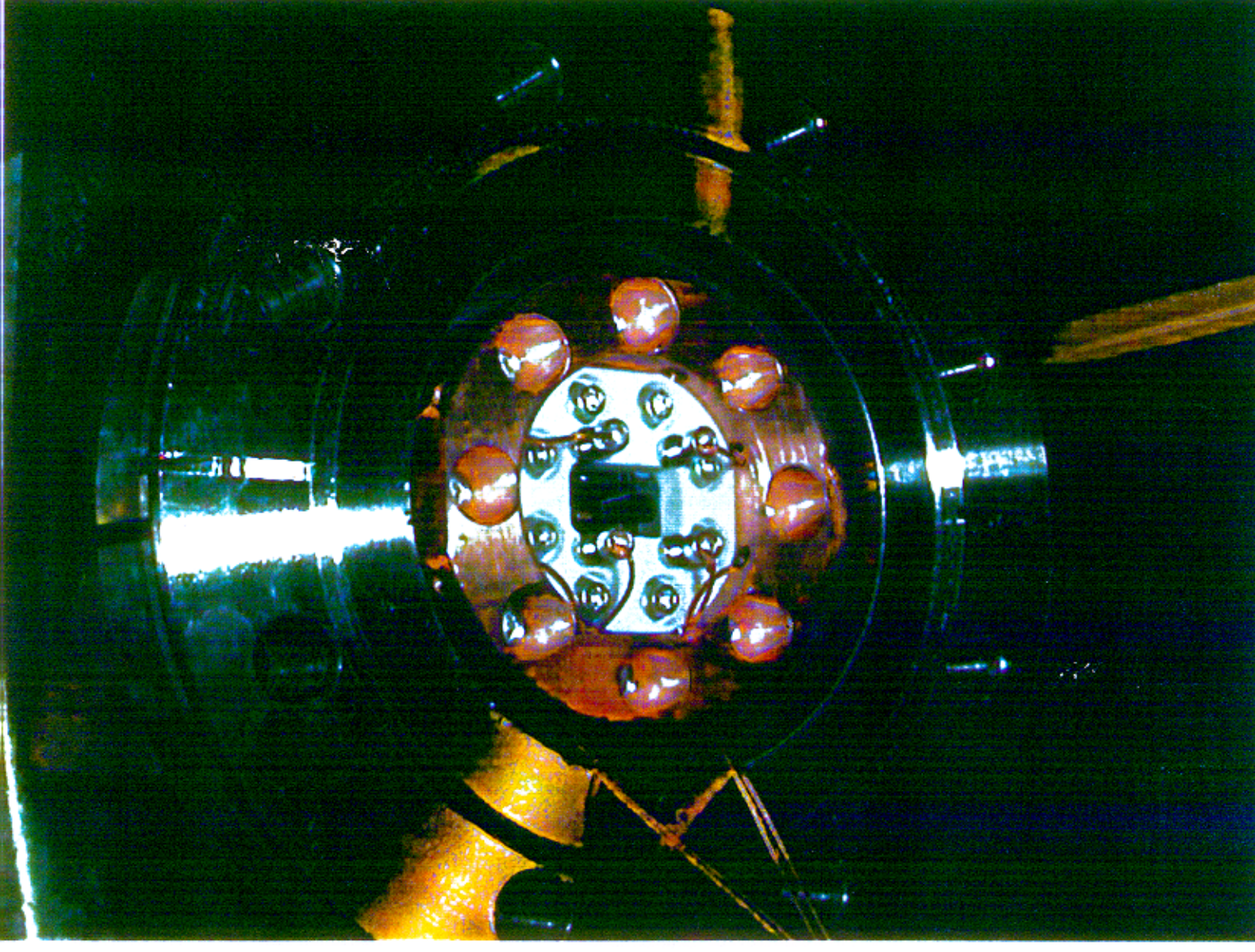


Output signal from a photoemission-type TBPM test sample in configuration (c) as a function of the stage vertical motion. ID-6 undulator gap was 28.2-mm. ESRF storage ring current was 121-mA

B2-20 and B2-30 x-ray beam-position-monitor/fixed mask combination for 4-ID





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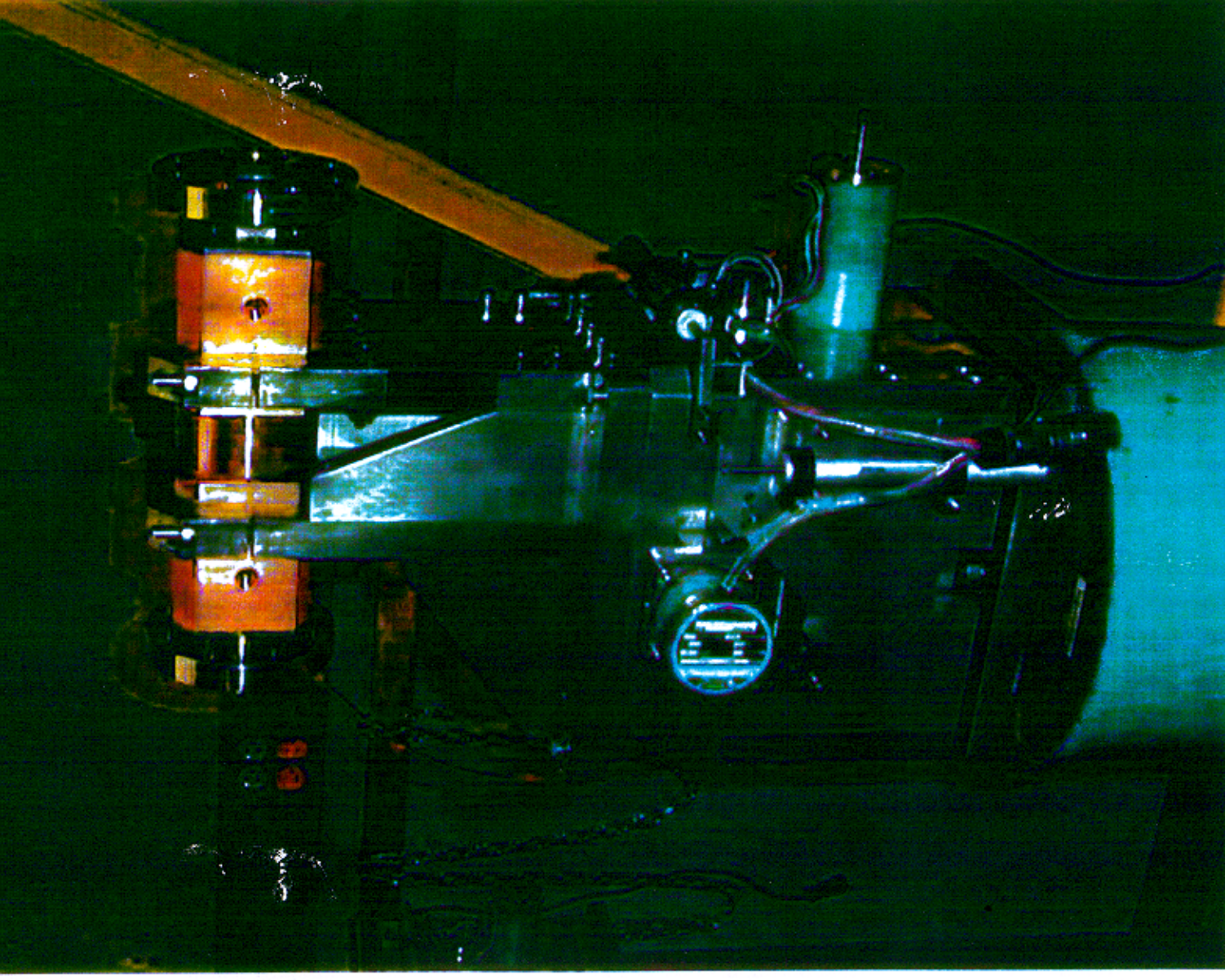

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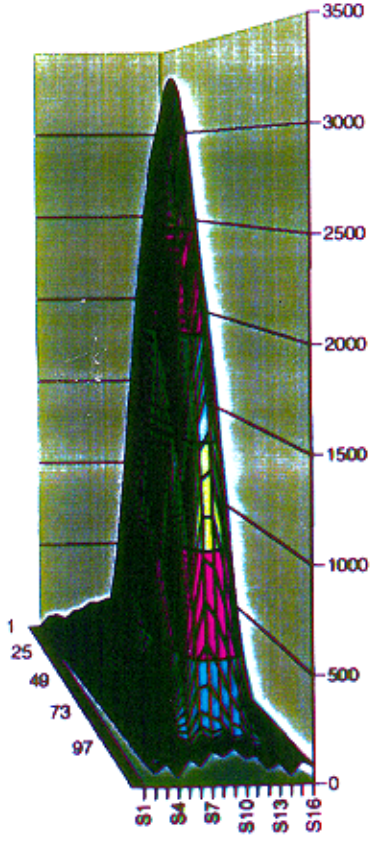
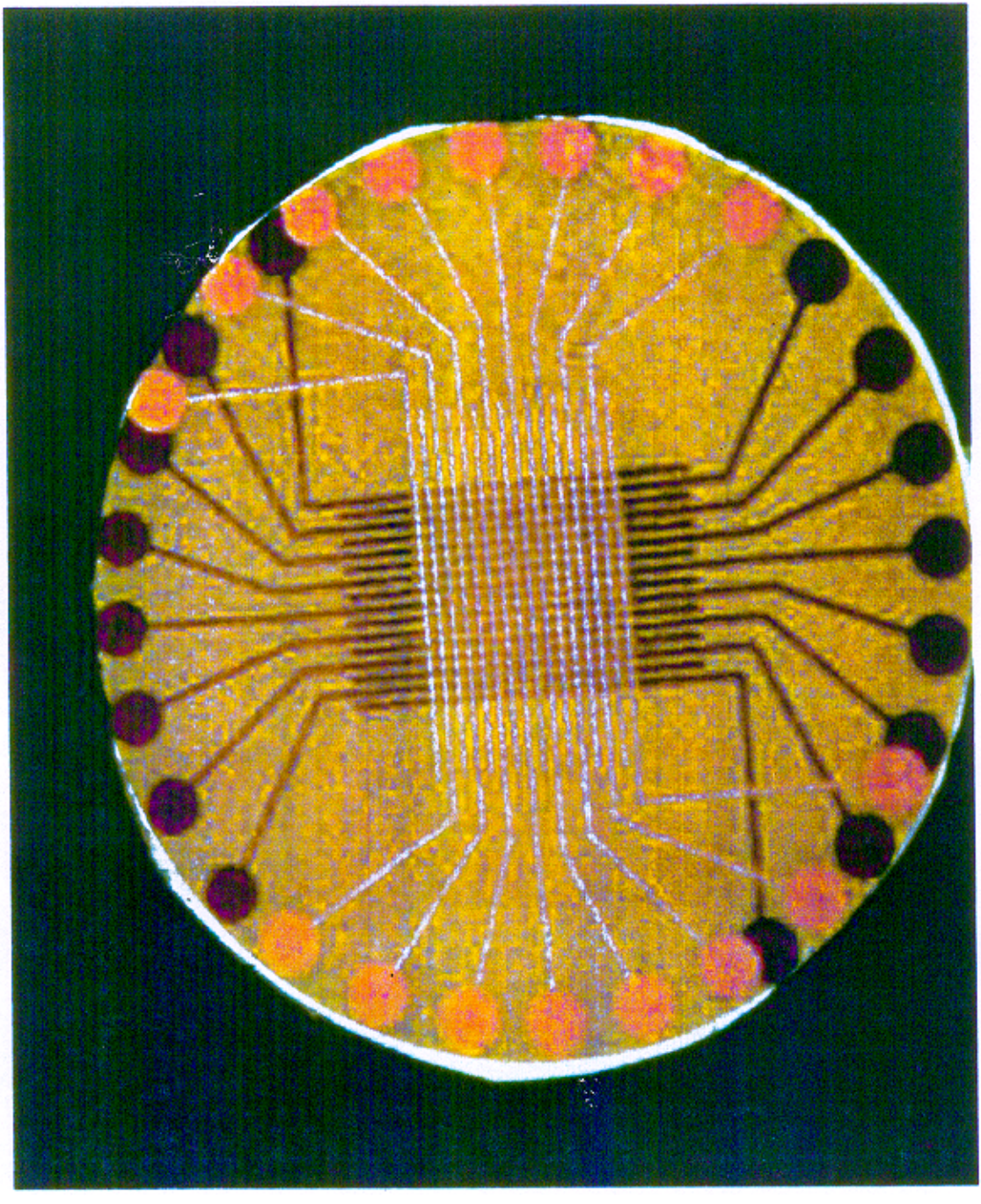
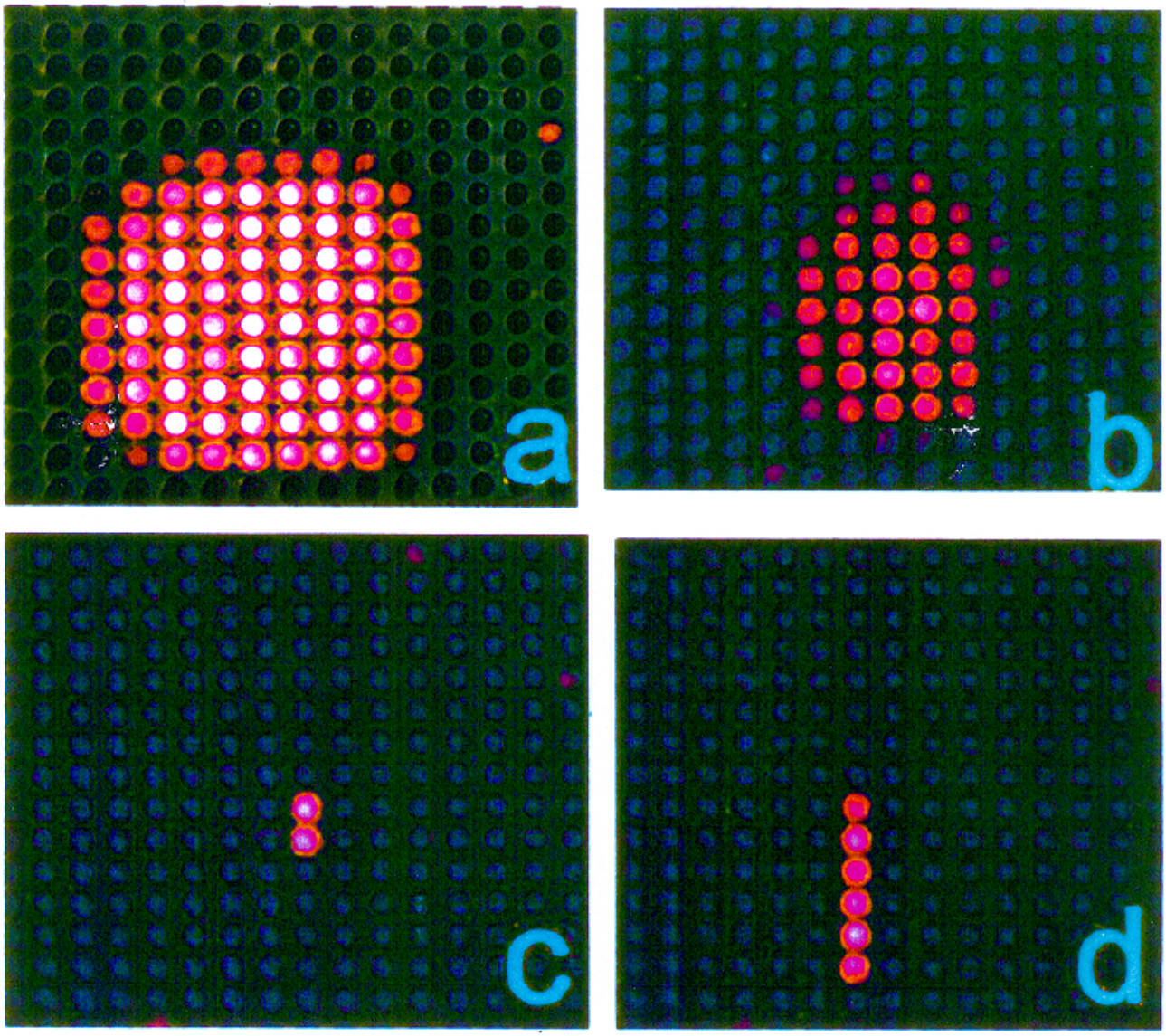


A typical profile of APS undulator white beam directly measured by a 16-pixel linear-array PSPCD.

APS 16 X 16 pixel Synthetic Diamond-Based

Position-Sensitive Photoconductive Detector (PSPCD) Prototype





Different images observed on the LED array with various undulator gap sizes and slits settings.

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