International Workshop for New Opportunities in Hard X-ray Photoelectron Spectroscopy

HAXPES 2009

MB Scientific AB HAXPES Analyser and High Voltage Electronics

MB Scientific AB

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International Workshop for New Opportunities in Hard X-ray Photoelectron Spectroscopy

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Abstract

1. MB Scientific Profile
2. MBS Technologies achieving stable operation at 12keV
3. New High Retardation Lens A1L2
4. Outlook of MBS High Energy Systems (A1HE, WR#1)
5. Other products;

   Spin detector with deflector, Multi Gas VUV Source T-1
6. MBS Policy

Mitsuse Matsuki, Peter Baltzer

BNL 2009-05-22

1. MB Scientific Company Profile

Established : **March 2001**

Managing Director:
Mitsuse Matsuki-Baltzer

Development Responsible:
Peter Matsuki-Baltzer

Number of employee: **5**

Main office : 4
Seminariegatan 29B,
Uppsala, Sweden

Asian service office: 1
1-1-10-601, Honjyonishi,
HigashiOsaka, Japan

2. MBS Technologies achieving stable operation at 12keV

Issues to address

1. Resolution (eV) / Kinetic Energy (eV) is very small at HAXPES conditions:

a) Electronics stability

MBS Original Discharge Detector

Patented Low Time Constant Circuit

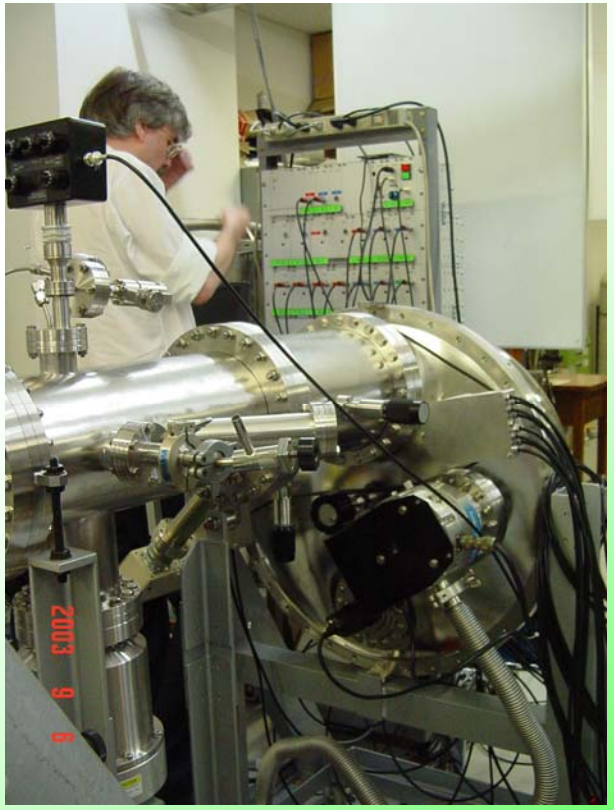
b) Keep a high analyser resolution at high acceptance angle and high floating voltage levels

Creep distances and Fields Penetration properly considered

Magnetic screening continues to be important

2. Low cross-section needs a high throughput system:

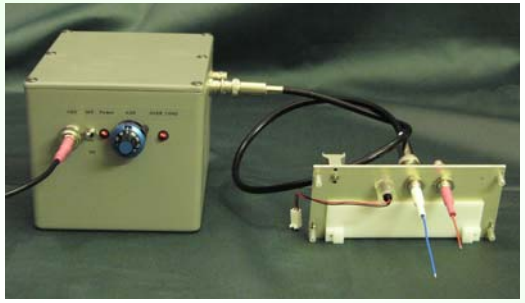
High Angular Acceptance Lens

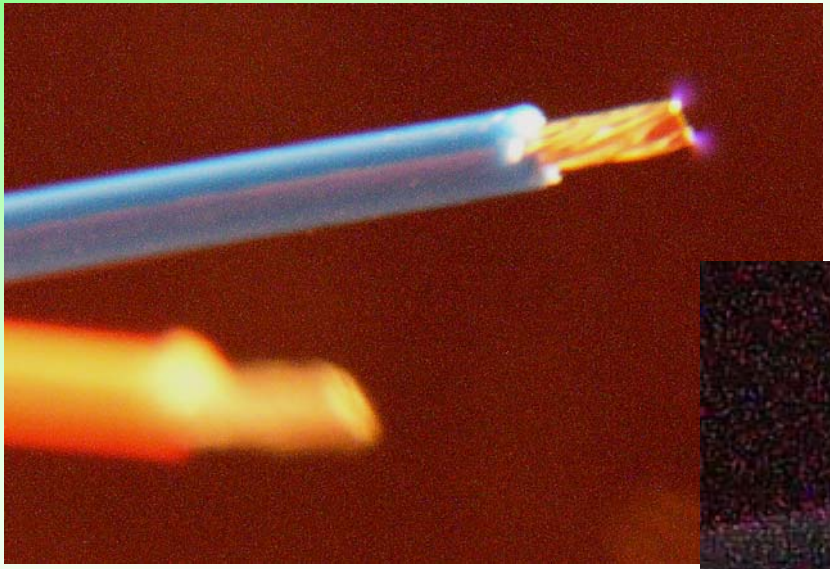


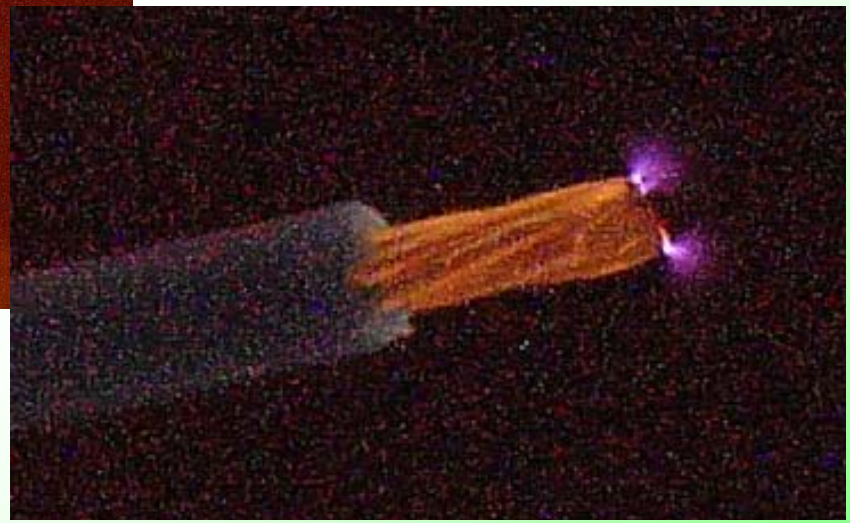
Electronics Development

2. MBS Technologies achieving stable operation at 12keV

Achieving Electronics Stability:







The Corona Discharge in Action at 12 kV

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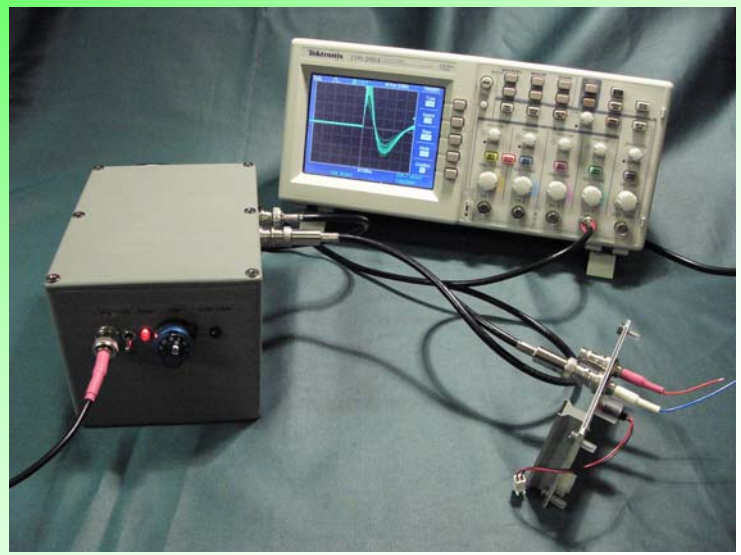
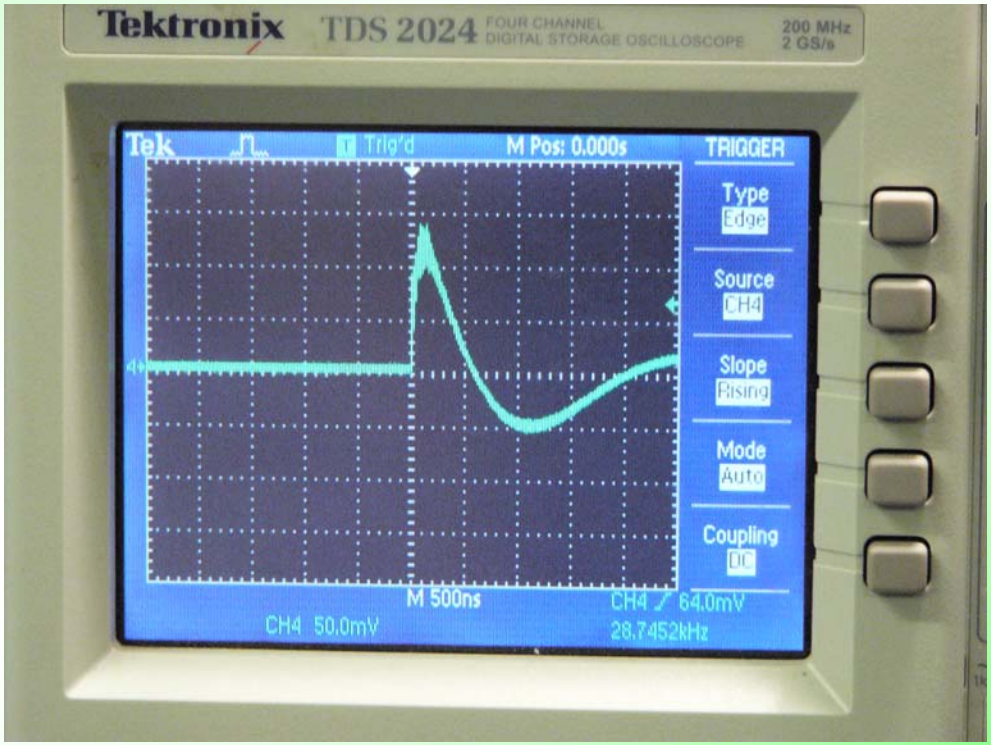
2. MBS Technologies achieving stable operation at 12keV

Achieving Electronics Stability:



MBS discharge detector:

A high energy PWM supply panel in simulated production test



Reality at 12 kV:

500 ns 100 mV pulses, 28 kHz repetition rate!
This is the origin of the hissing sound.

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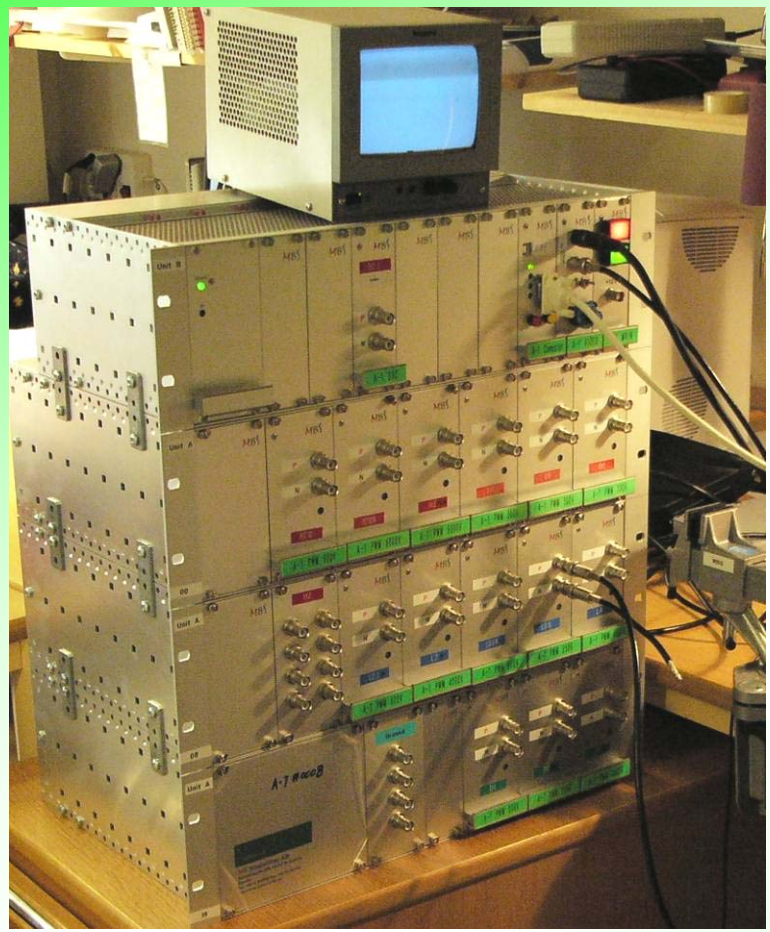
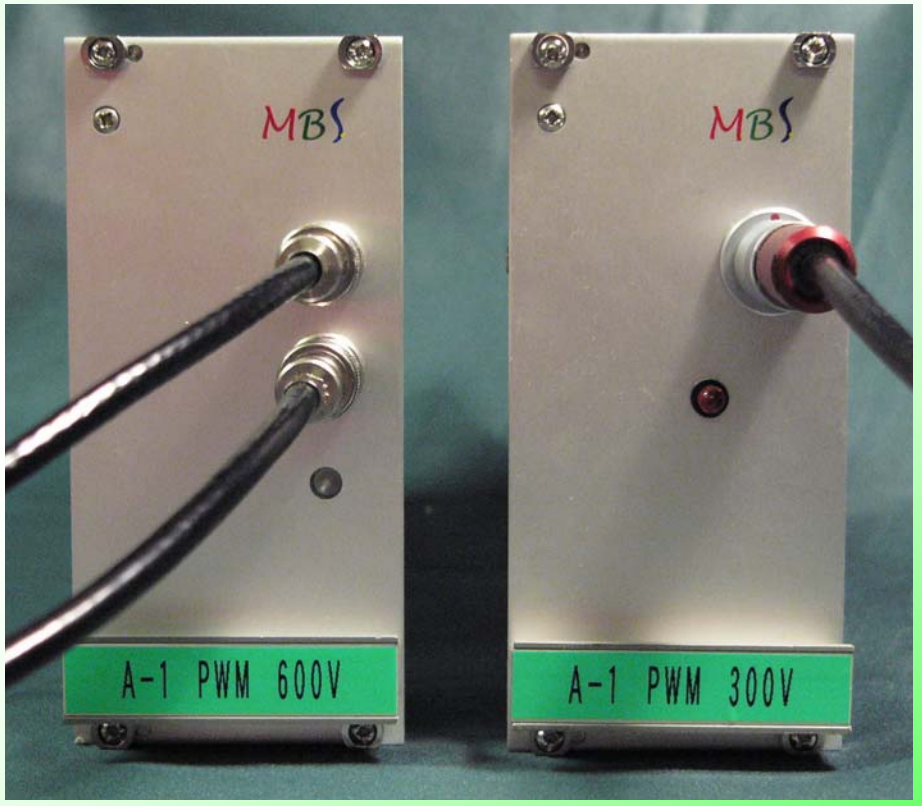
2. MBS Technologies achieving stable operation at 12keV



MBS A1 HAXPES Electronics

MBS A-1 PWM Panels:

Designed for 15 kV



High Energy Electronics Standard Electronics

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2. MBS Technologies achieving stable operation at 12keV

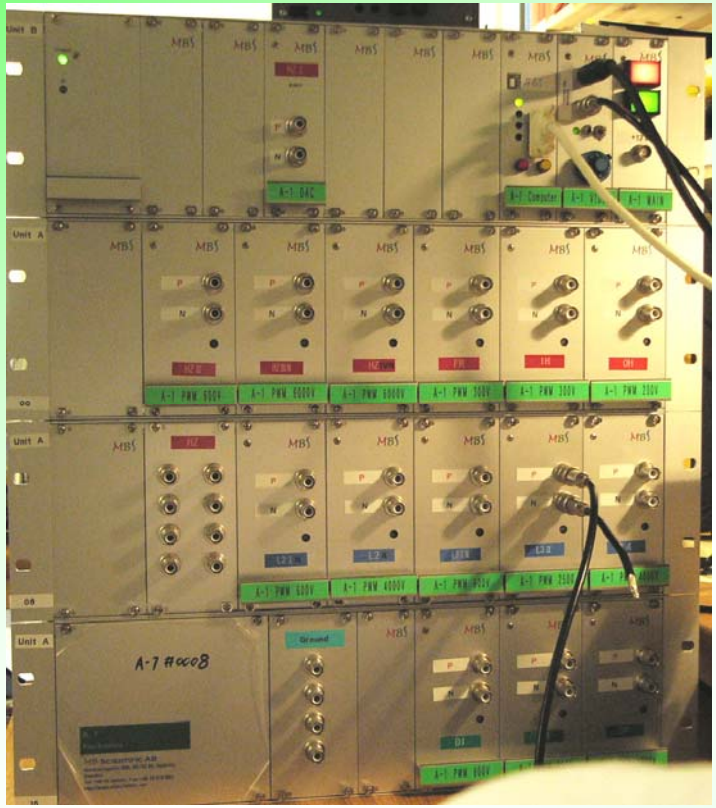

Fig. MBS A-1 High Energy Electronics

Fig. MBS A-1 Standard Electronics

Note! Case is at ground potential. It is VERY easy to check the system!!

Low cross-section needs a high throughput system:

High Angular Acceptance Lens: MBS A1L1

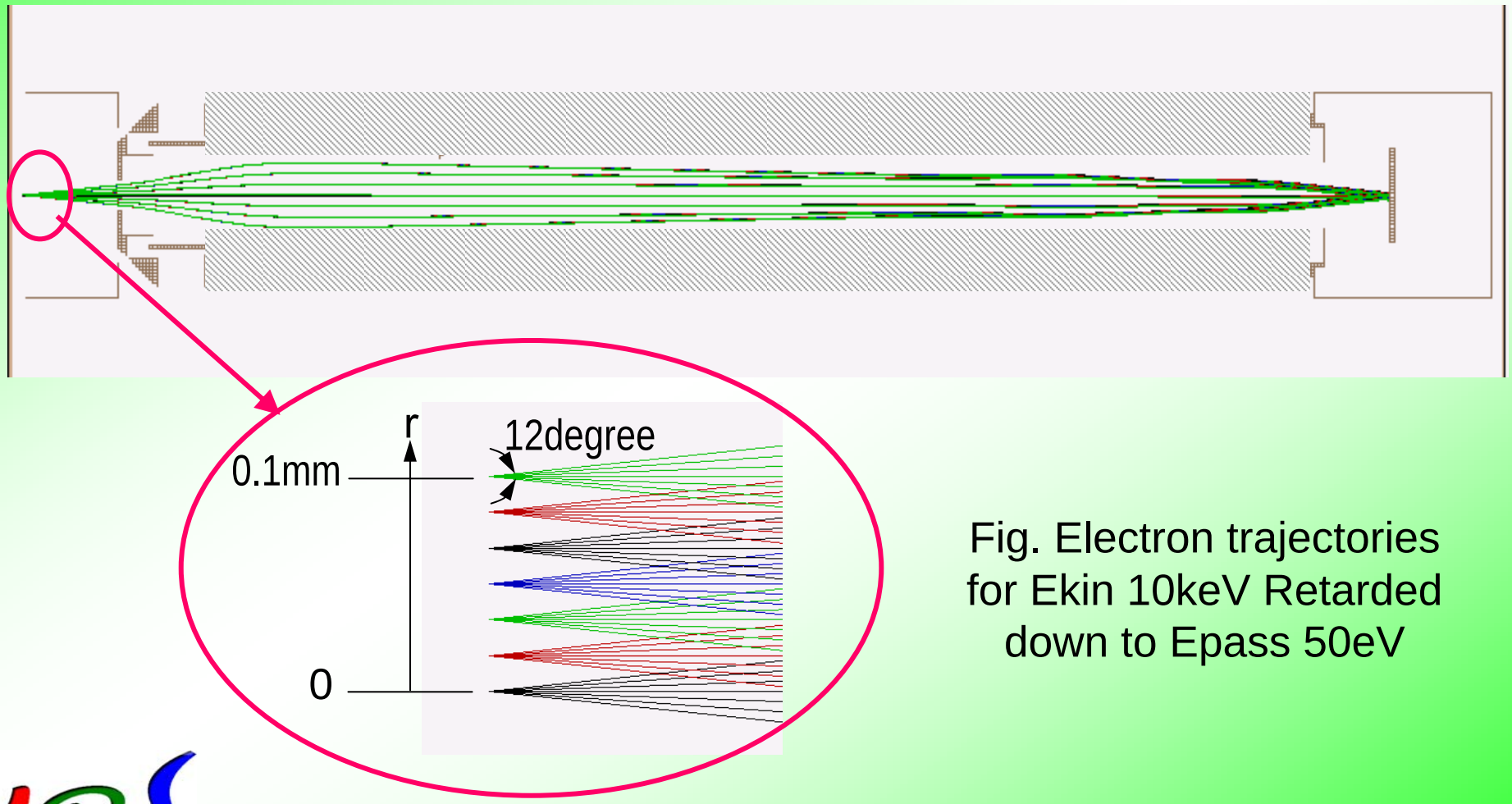

Fig. Electron trajectories for Ekin 10keV Retarded down to Epass 50eV

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3. New High Retardation Lens A1L2

High Angular Acceptance & High Retardation Lens: MBS A1L2

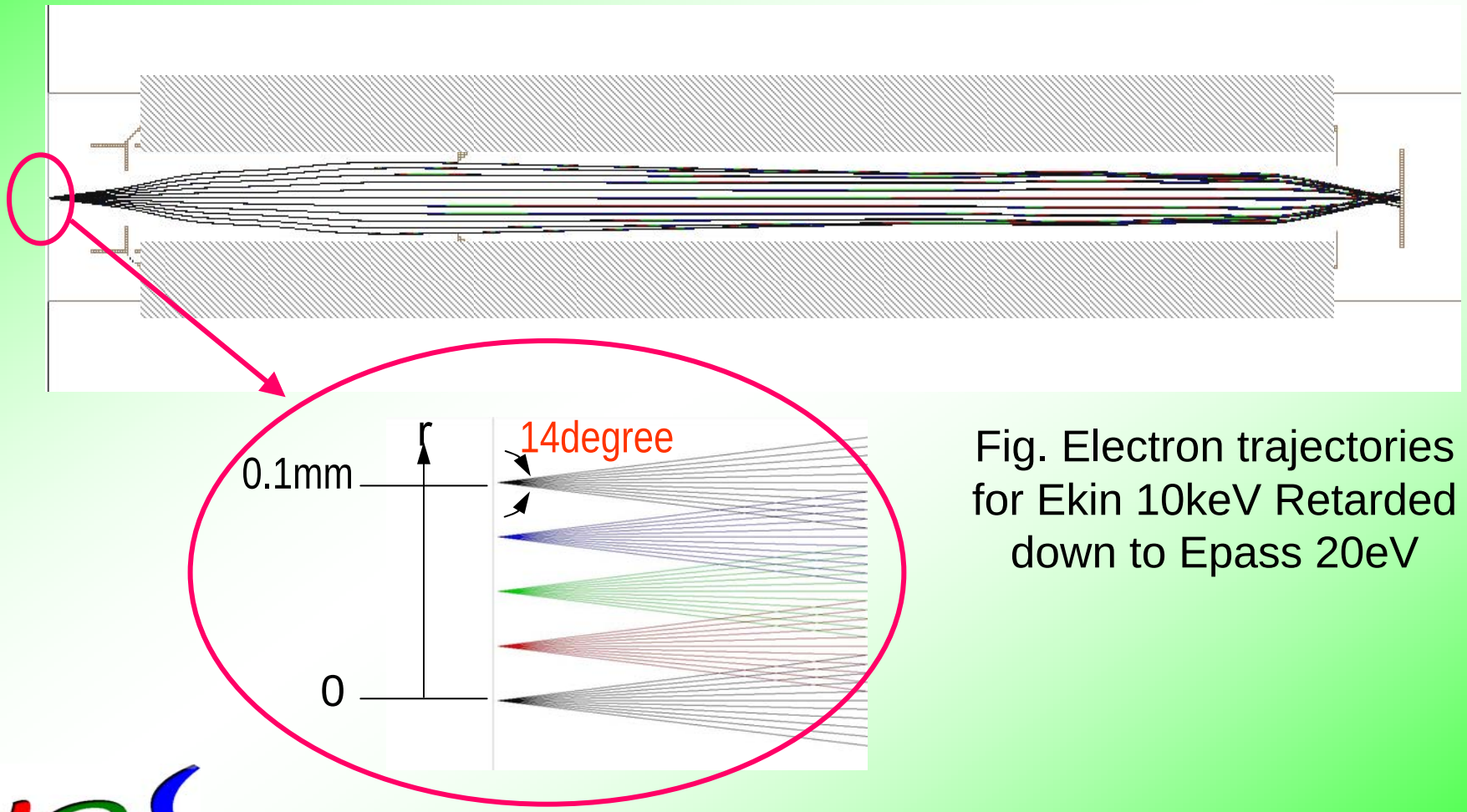

Fig. Electron trajectories for Ekin 10keV Retarded down to Epass 20eV

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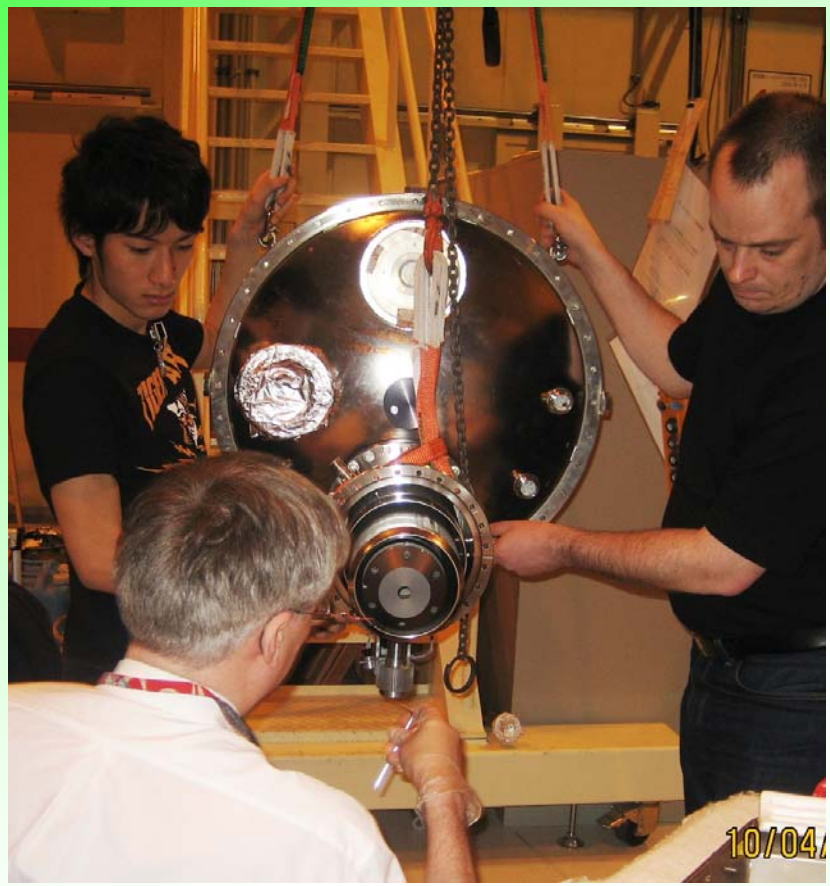
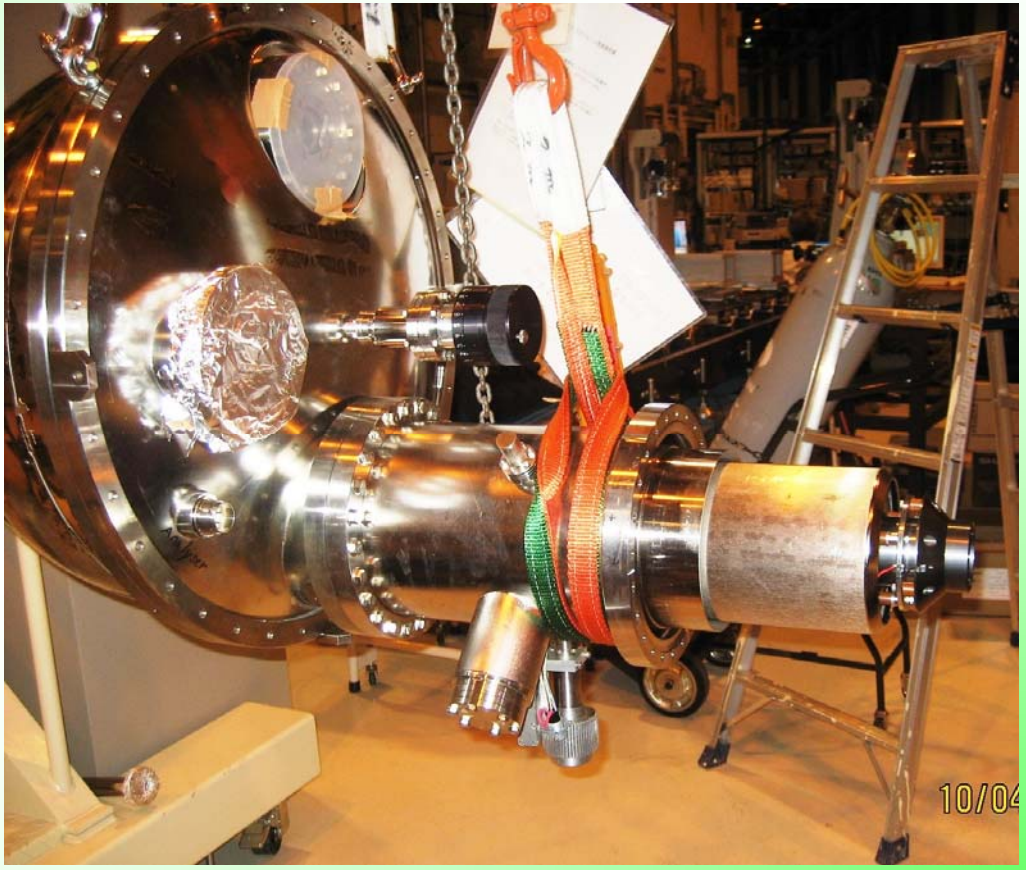
3. New High Retardation Lens A1L2





Left) A1L1 before lens exchange

Right) A1L2 after lens exchange

Fig. MBS A-1 HE Osaka Univ. at Spring-8

4. Outlook of MBS High Energy Systems (A1HE)

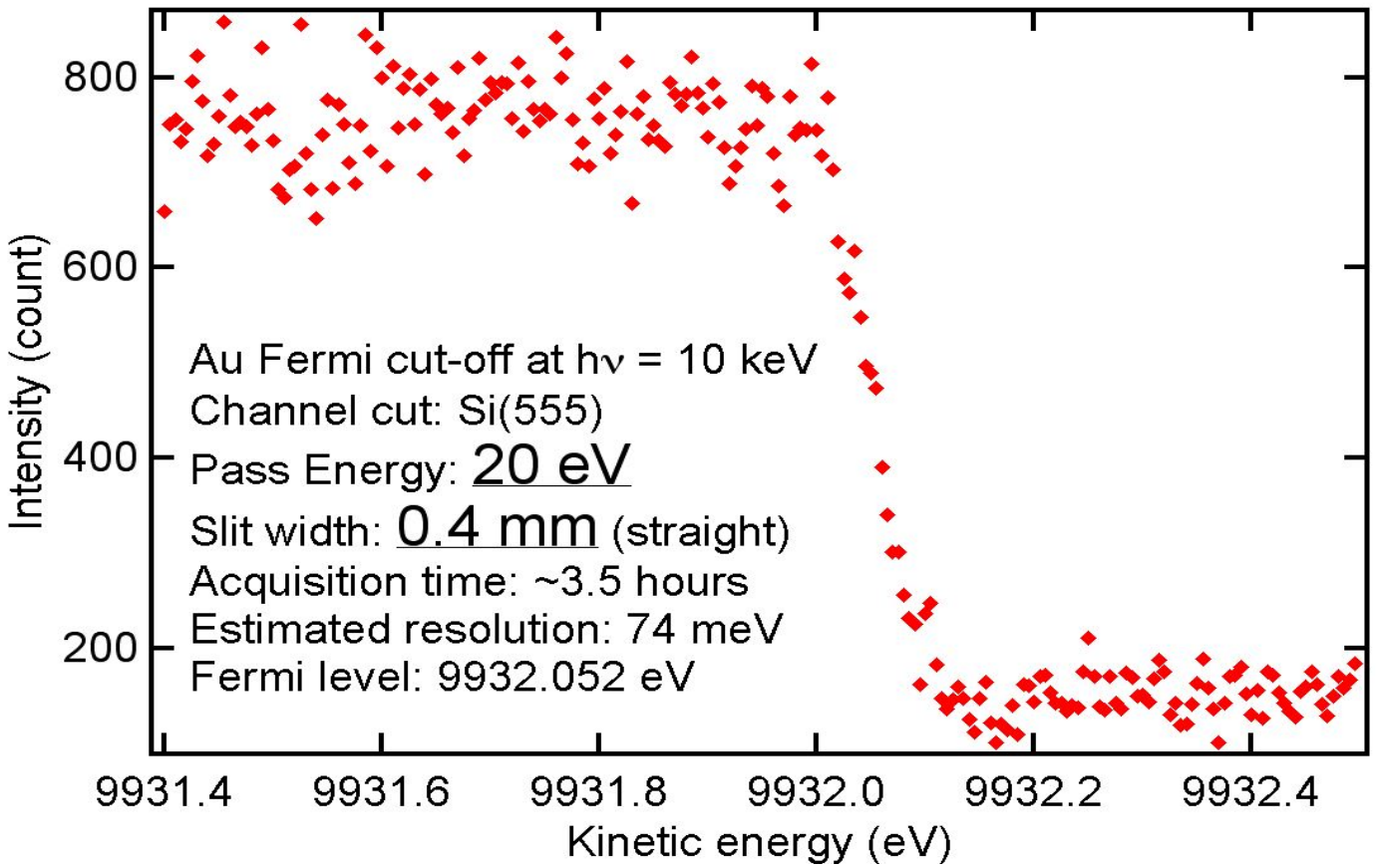
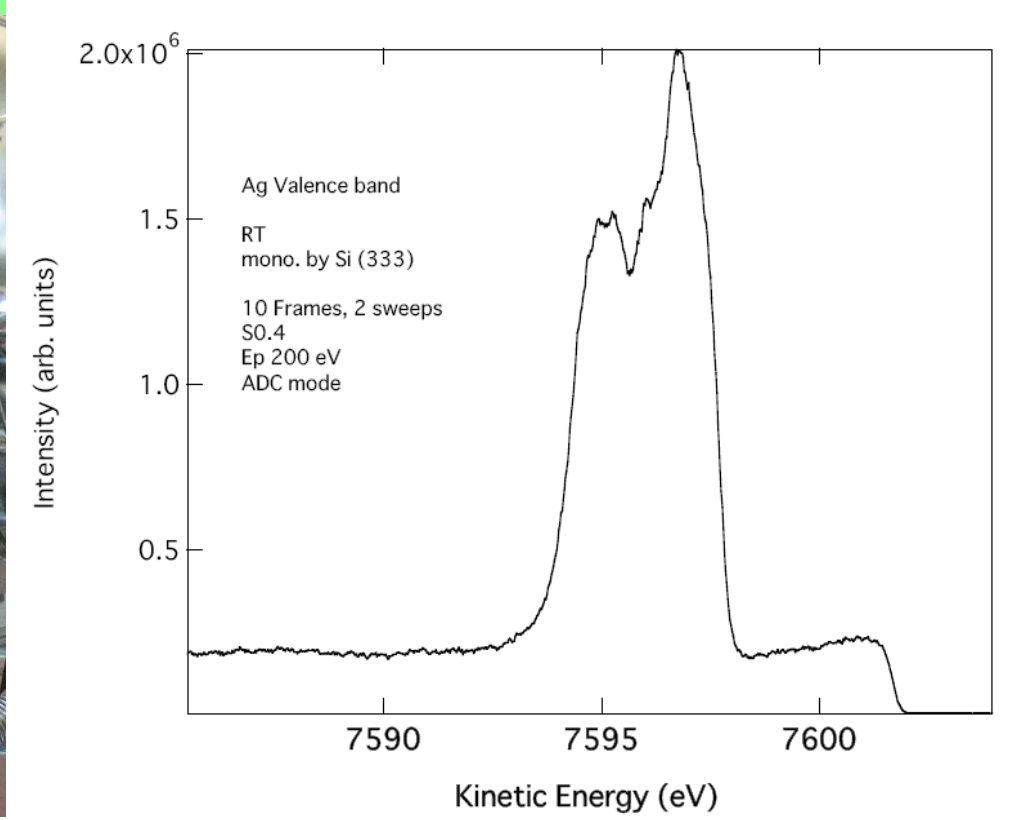


Fig. Au data taken by A-1 HE at BL19LXU SPring-8

Measured by A. Sekiyama, A, Higashiya, M. Yabashi S. Suga, and T. Ishikawa

4. Outlook of MBS High Energy Systems (A1HE)



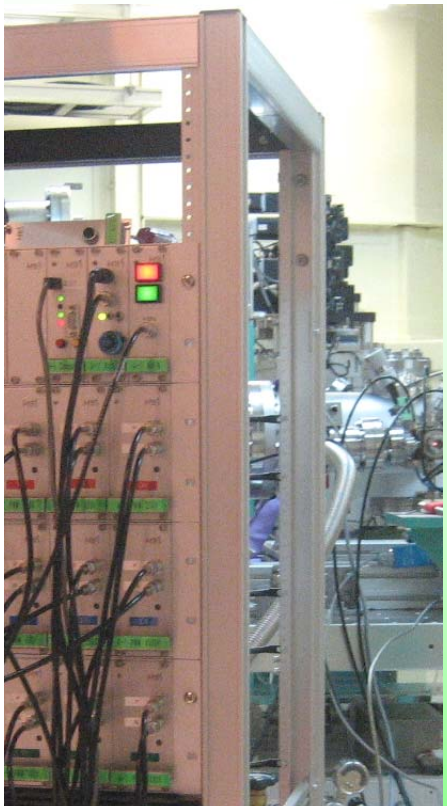
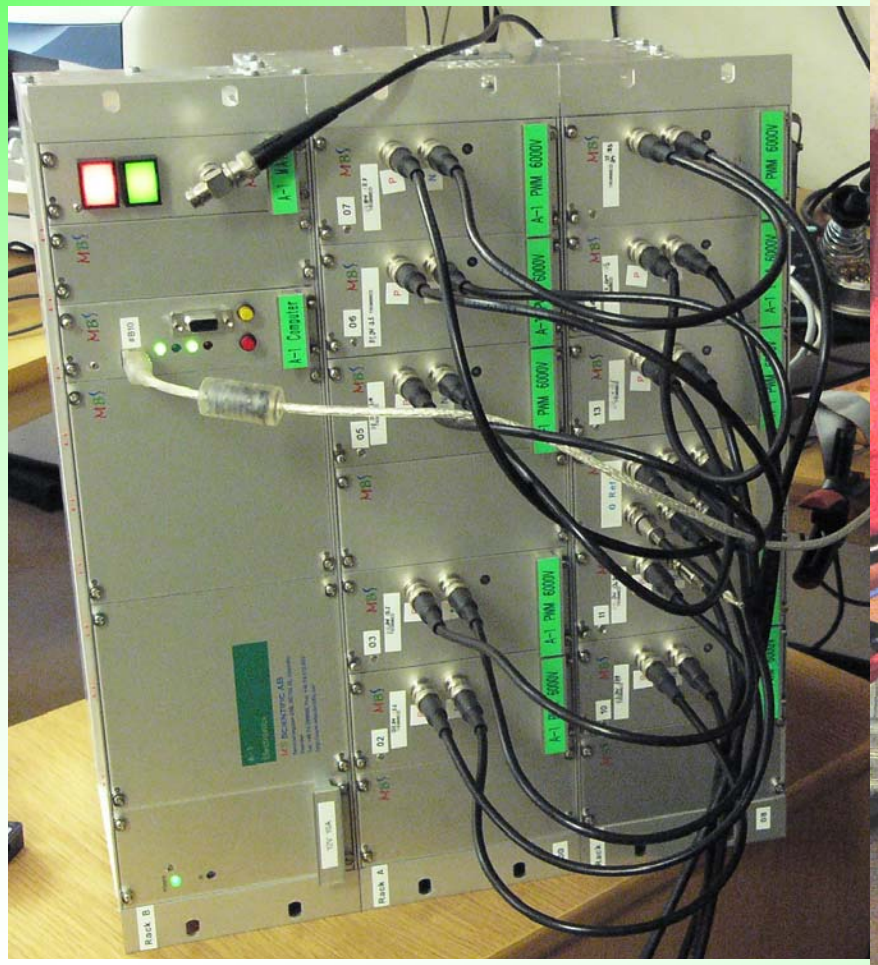


Fig. Ag date taken by A1_HE at Spring-8 BL12

Measured by T. Fujiwara, C. Schuessler-Langeheine, K. D. Tsuei, L. H. Tjeng

MBS A-1 HAXPES Analyser_Köln University@SPring-8

4. Outlook of MBS High Energy Systems (WR#1)



MBS WR#1 Electronics: Delivery test at -12kV

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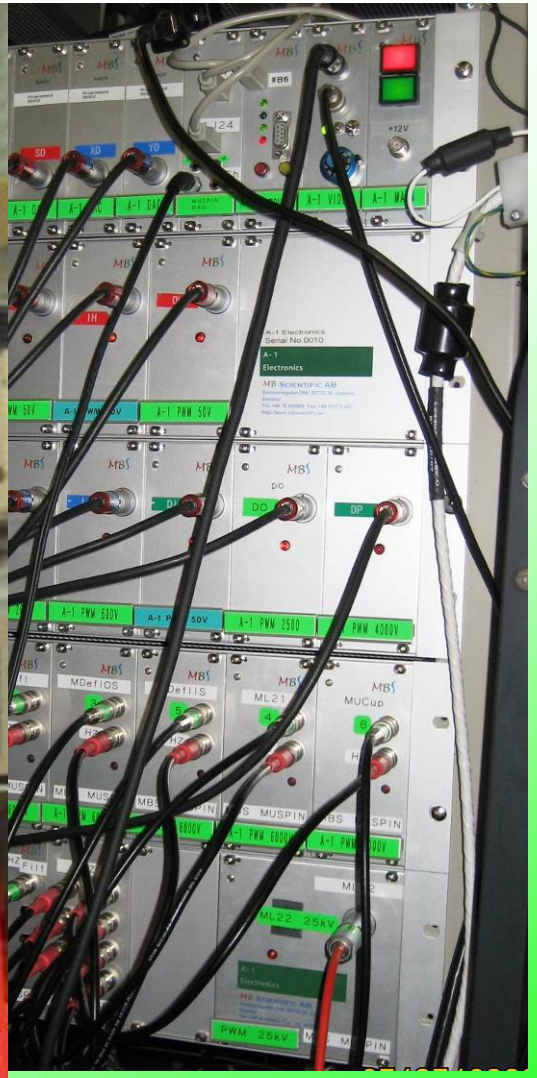
5. Other products;
MBS MUSPIN with deflector



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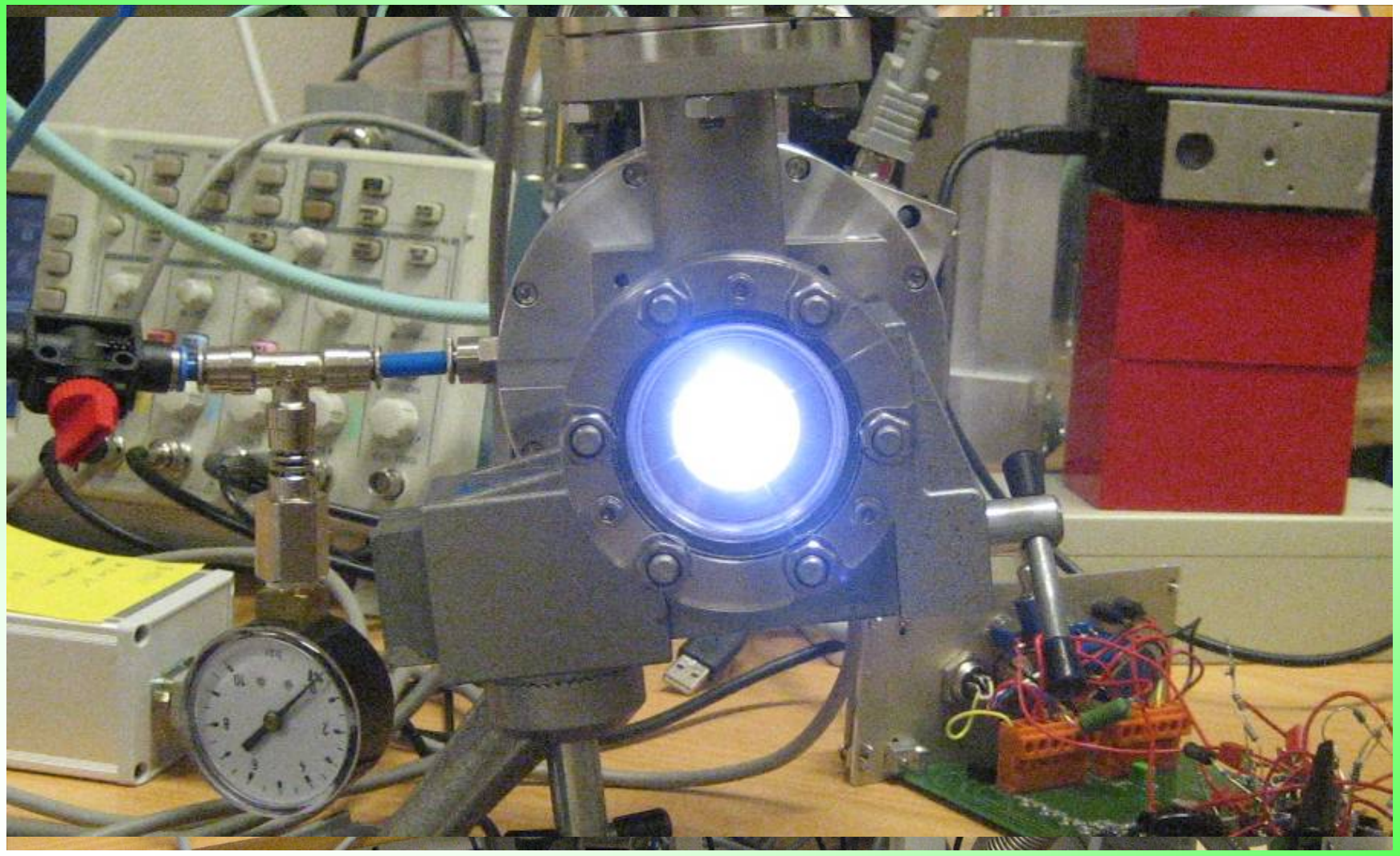
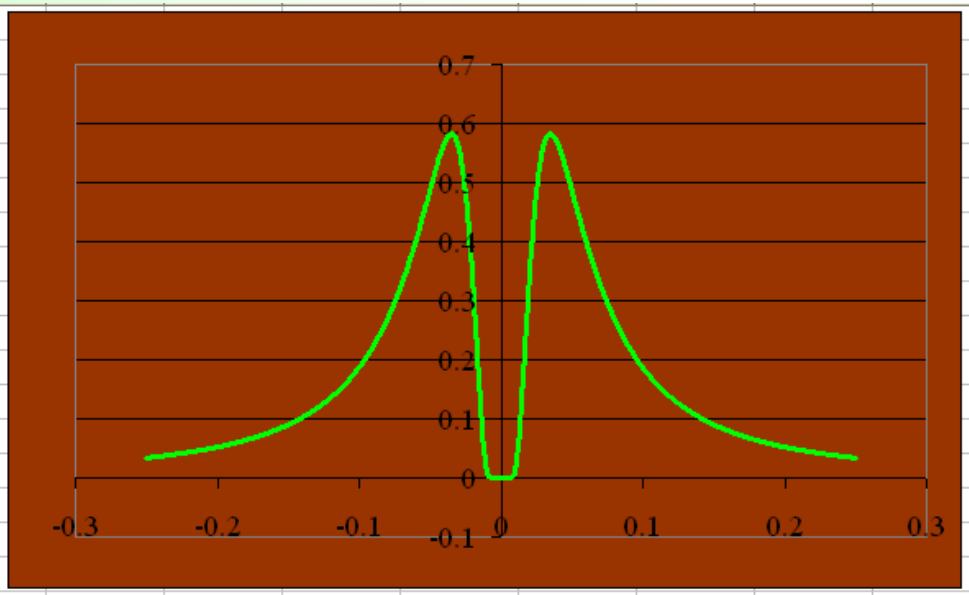
5. Other products;
MBS T-1 Multi Gas VUV Light Source



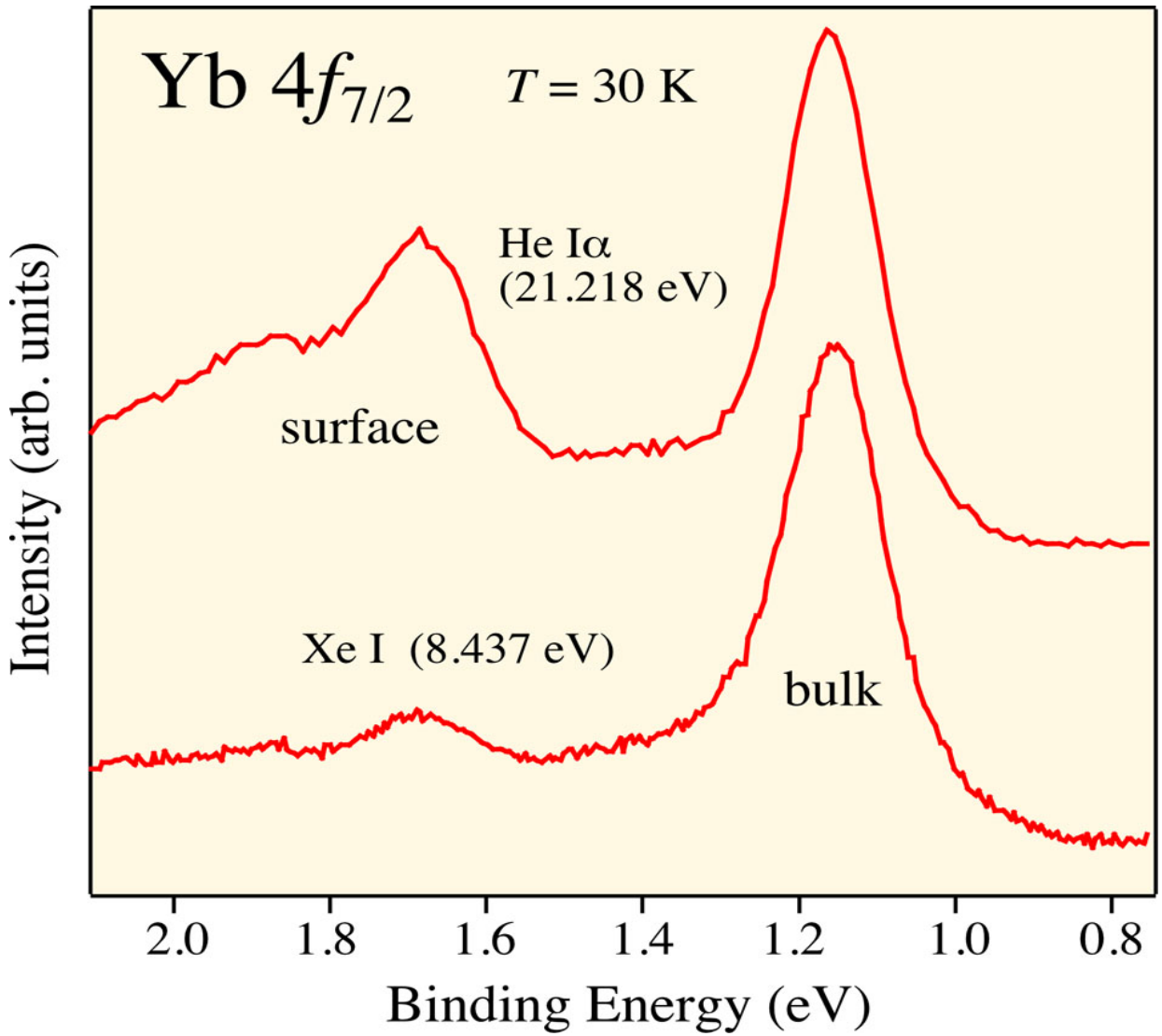
5. Other products;
MBS T-1 Multi Gas VUV Light Source

lambda0	1.47E-07		Wavelength
f0	2.0394E+15		Oscillator strength
E0	8.435369009	eV	Energy
p	2.00E+00	Pa	Pressure
n0	5.30E+20	at/m3.Pa	Atoms/m3*Pascal
tau	3.79E-09	3.46E-9?	Nat. Lifetime
deltafpress	2.15E+06	ResBroad.	Pressure Broadening
deltafnat	4.20E+07	NatBroad.	Nat. Broadening
deltaf	4.41E+07		Total Lorenz.
deltae	1.83E-07	eV	Lorenz. deltaEnergy
gfact	3.00E+00		Spinstatistics
k0	1.07E+08		
llength	5.00E-02		Plasmalength
dlength	1.00E-02		DarkgasLength
SpecWidth	0.5	meV	SpectrumScale



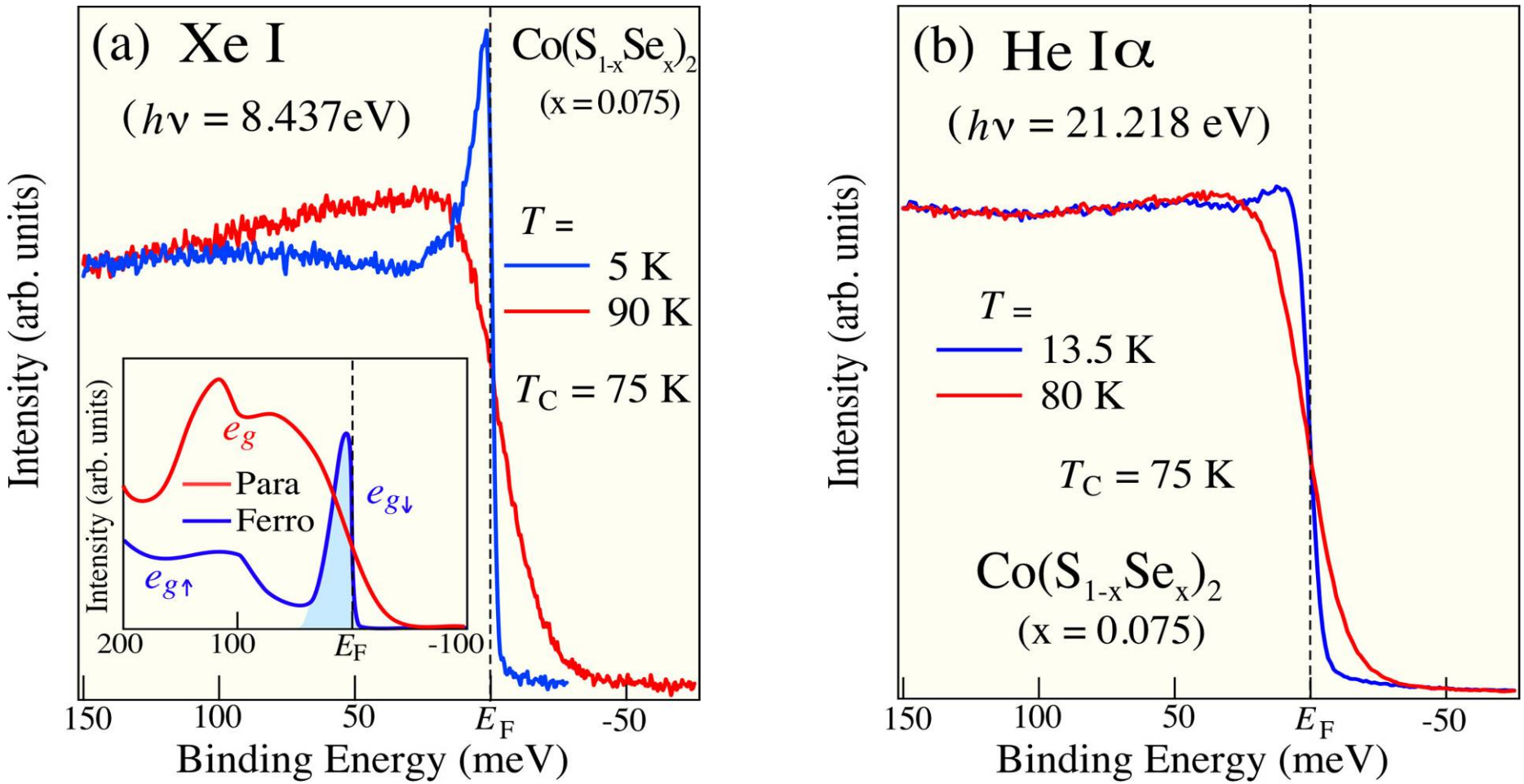
Series	meV	f	NormLor	Lineint	k	Em	Trans	Tot
-1000	-0.25	-6.04E+10	1.92328E-15	3.6101E+14	0.694323	0.03412	0.993081	0.033884
-999	-0.24975	-6.04E+10	1.92713E-15	3.6101E+14	0.695714	0.034188	0.993067	0.033951
-998	-0.2495	-6.03E+10	1.931E-15	3.6101E+14	0.697109	0.034255	0.993053	0.034017
-997	-0.24925	-6.03E+10	1.93487E-15	3.6101E+14	0.698508	0.034323	0.993039	0.034084
-388	-0.097	-2.35E+10	1.27755E-14	3.6101E+14	4.61209	0.205947	0.954927	0.196664
-387	-0.09675	-2.34E+10	1.28416E-14	3.6101E+14	4.635955	0.206894	0.954699	0.197521
-386	-0.0965	-2.33E+10	1.29083E-14	3.6101E+14	4.660007	0.207847	0.954469	0.198383
-385	-0.09625	-2.33E+10	1.29754E-14	3.6101E+14	4.684246	0.208806	0.954238	0.199251
-384	-0.096	-2.32E+10	1.30431E-14	3.6101E+14	4.708675	0.209772	0.954005	0.200123
-383	-0.09575	-2.31E+10	1.31113E-14	3.6101E+14	4.733296	0.210744	0.95377	0.201001

High bulk sensitivity of Xe discharge lmap



S. Souma *et al.*, Rev. Sci. Instrum. **78** (2007) 123104.

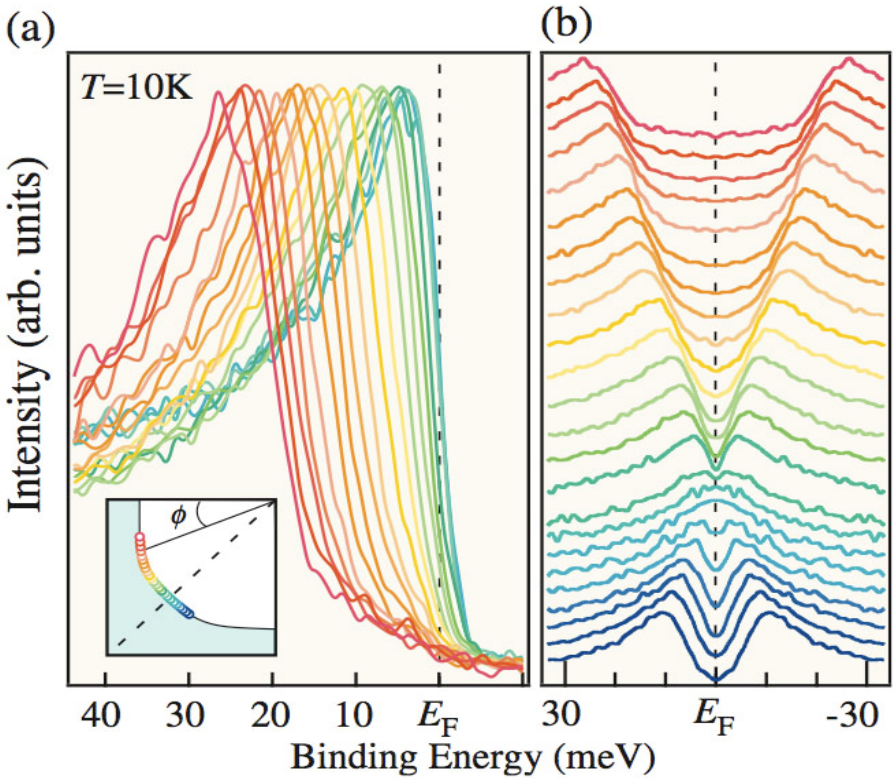
Ferromagnetic transition of $CoS_{2-x}Se_x$



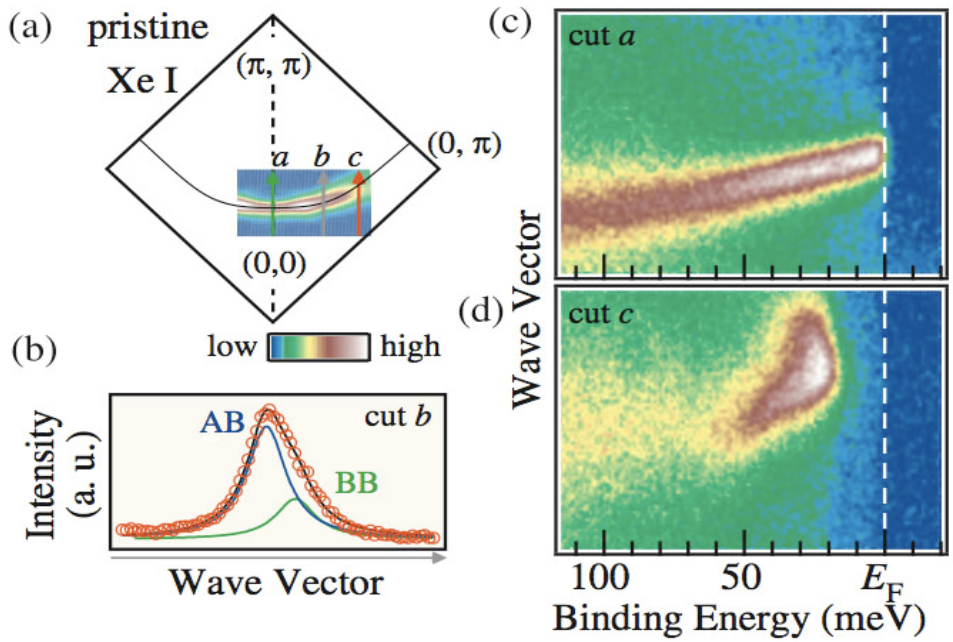
T. Sato *et al.*, Phys. Rev. B **76** (2007) 113102.

High-Tc superconductor

Superconducting gap

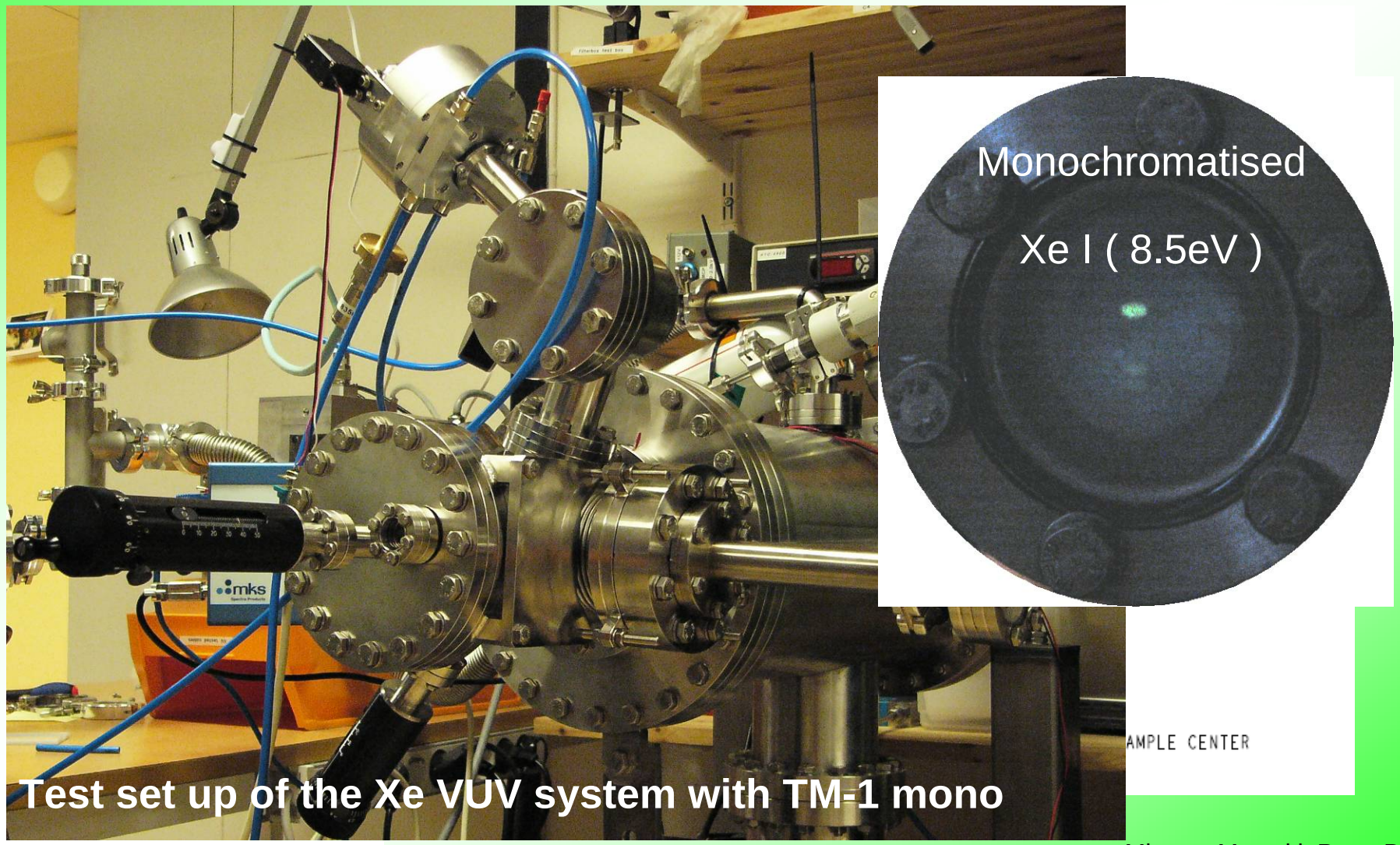


Band structure and Fermi surface



T. Sato *et al.*, Phys. Rev. B **78** (2008) 100502(R).

5. Other products;
MBS TM-1 Twin Monochromator



Test set up of the Xe VUV system with TM-1 mono

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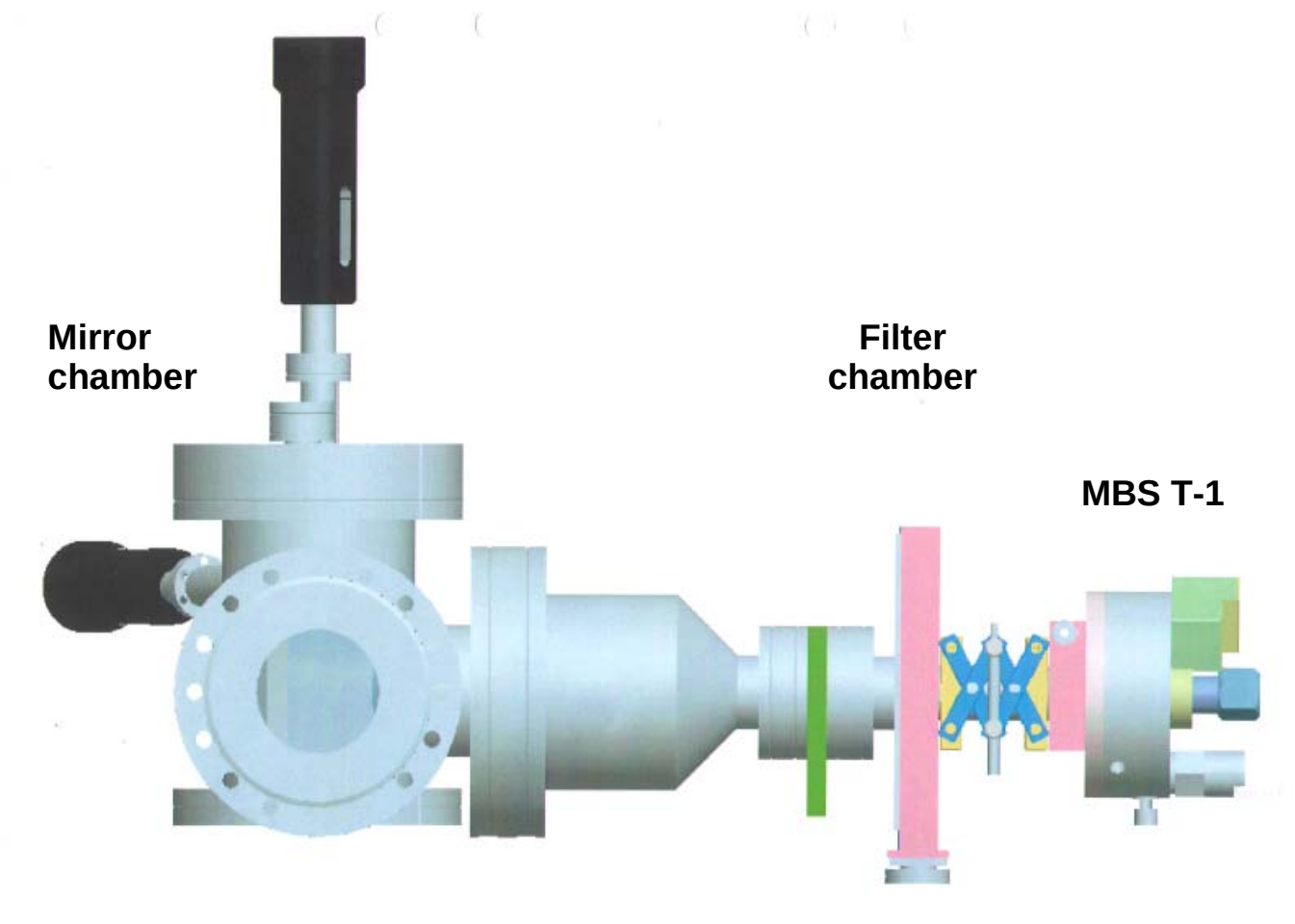
5. Other products;
MBS F-1 Filter System for T-1 Light Source



6. MBS Policy

- As **"Owner Managing Company"** we focus to make customer feel satisfied.
- Be always **faithful** towards our customer and makes **clear responsibility** in the company
- Our pride is having the **Best products** with **best support** to make our customer producing quickly and continuously world leading data for their research.

Acknowledgments

We wish to express a Great Thanks to all our customers who trust us and decided to purchase our products and services. Your trust in our competence let us exist and made all our development possible.

MB SCIENTIFIC AB

is your partner for advanced science!

Please visit our booth at exhibition for a discussion!

You are most welcome!!

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E-mail: info@mbscientific.se Homepage: www.mbscientific.se