keV中性子捕獲実験の状況
ー東工大ペレトロンー

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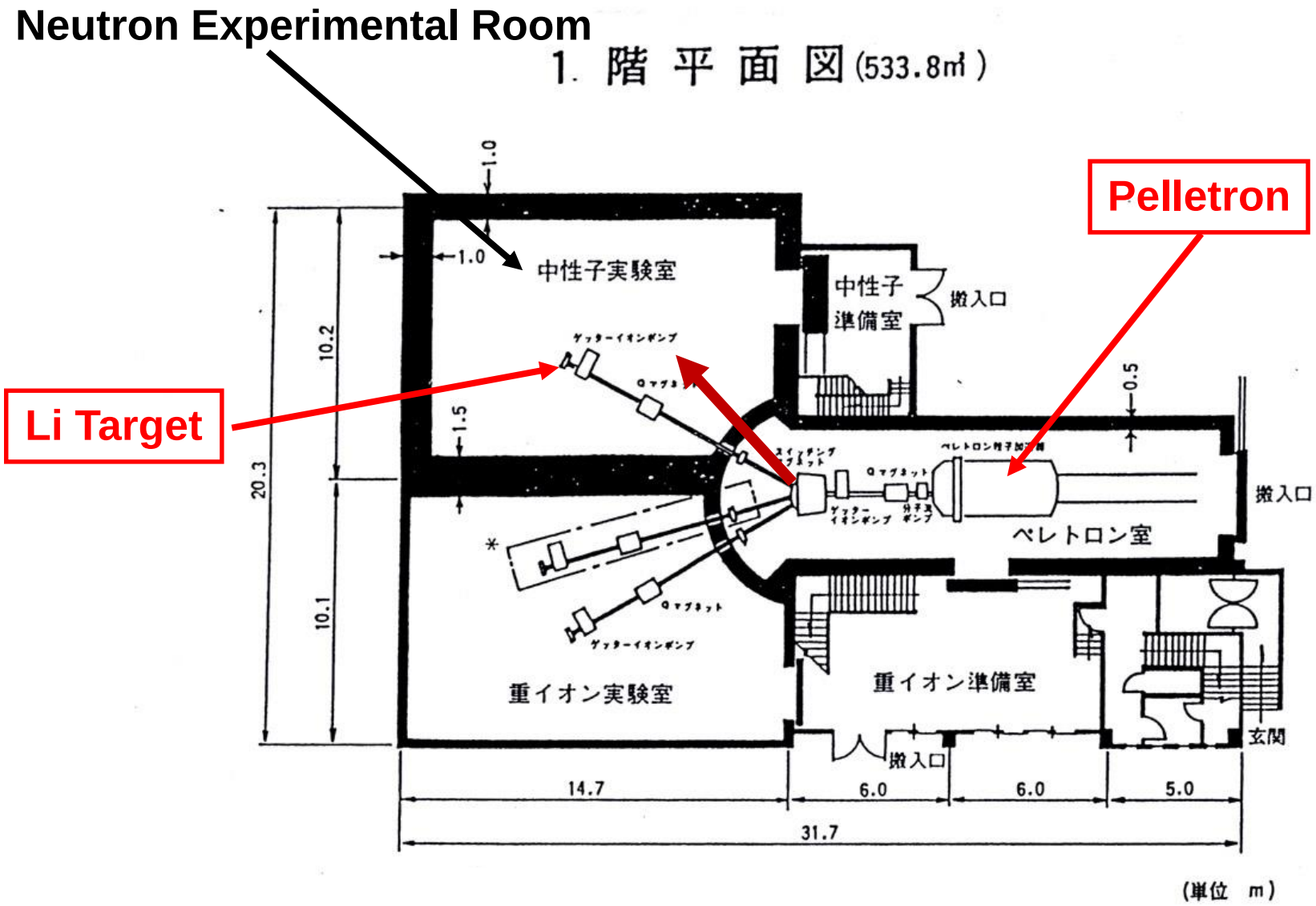
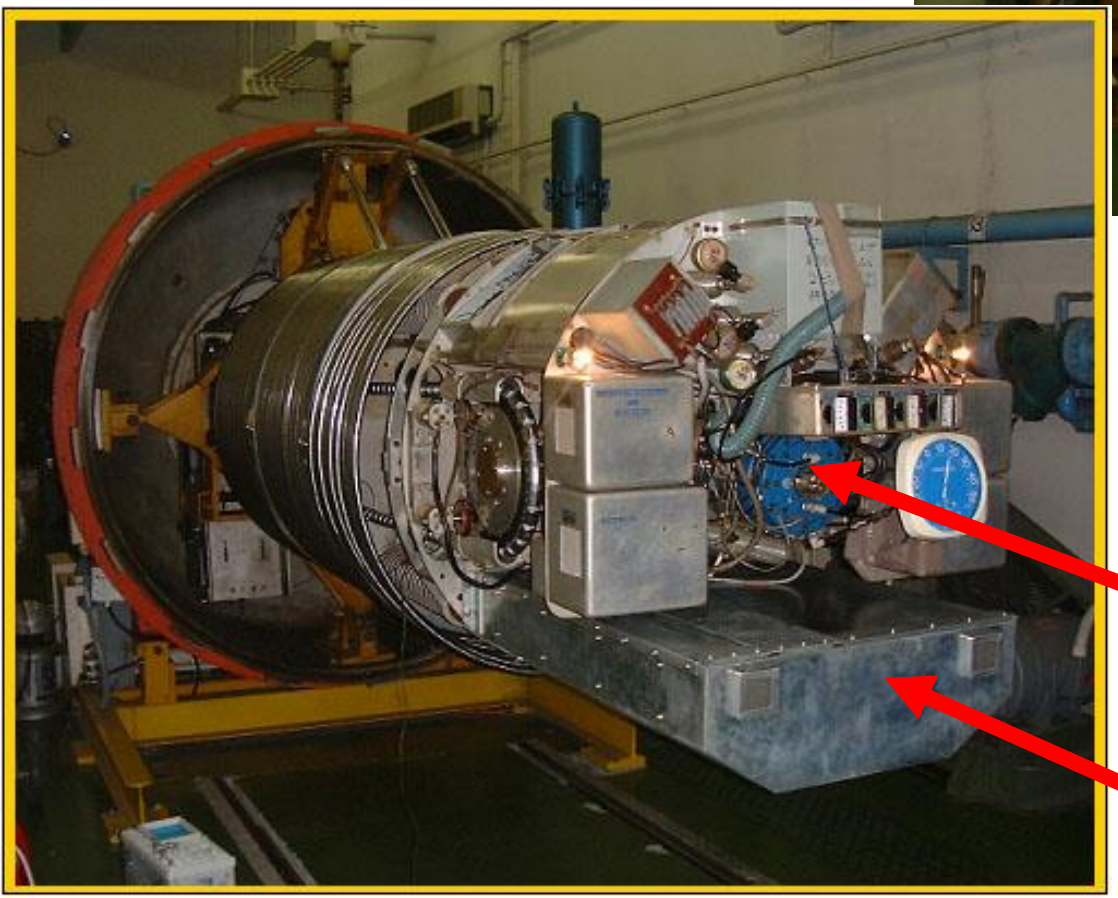
Pelletron Facility at Tokyo Tech



3U-HC Pelletron at Tokyo Tech

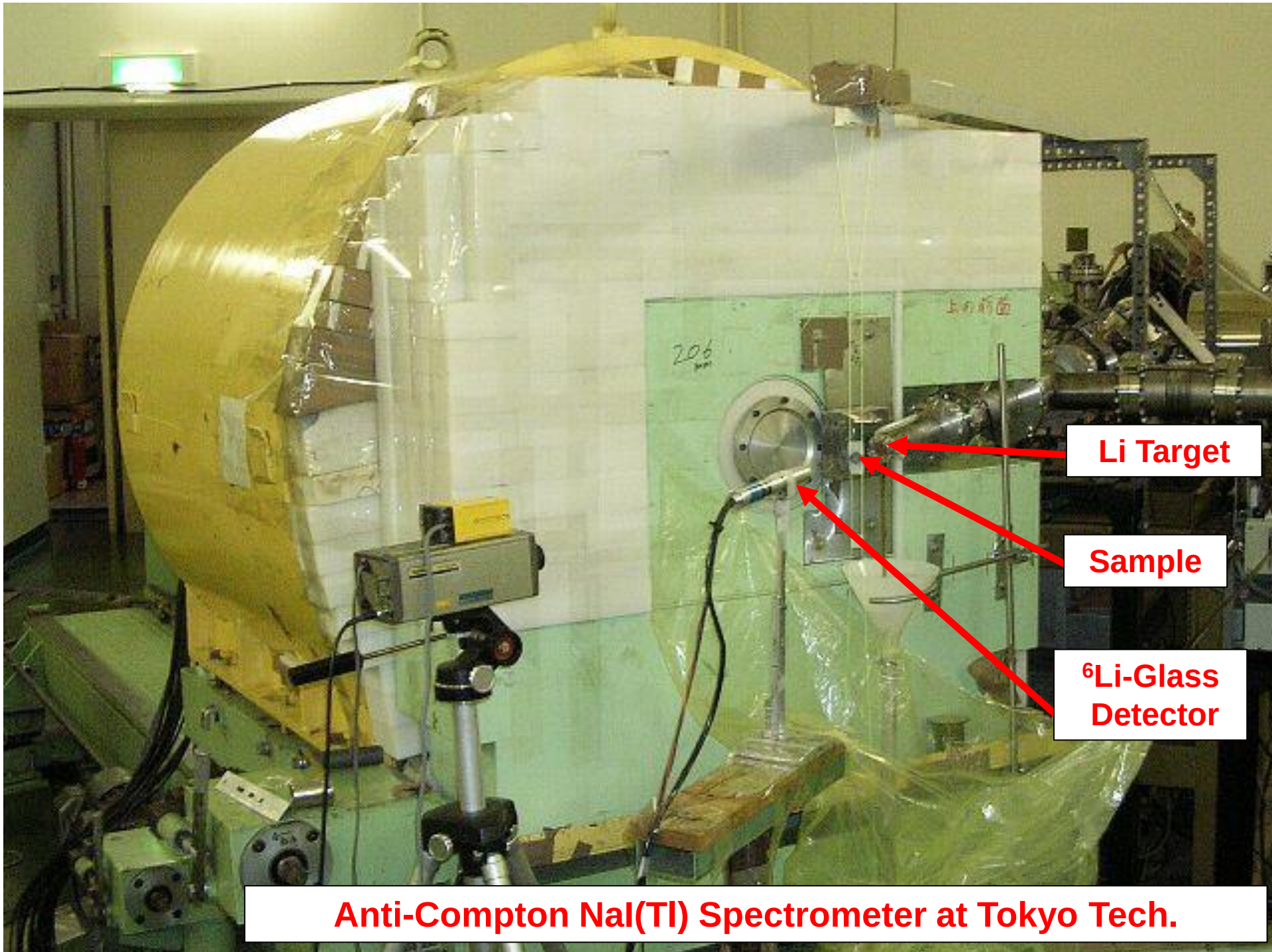
Beam Pulsing System at Terminal
- **Pulse Width: 1.5 ns (FWHM)**
- **Peak Current: 2 mA**
- **Repetition: 4, 2, 1, 0.5 MHz**



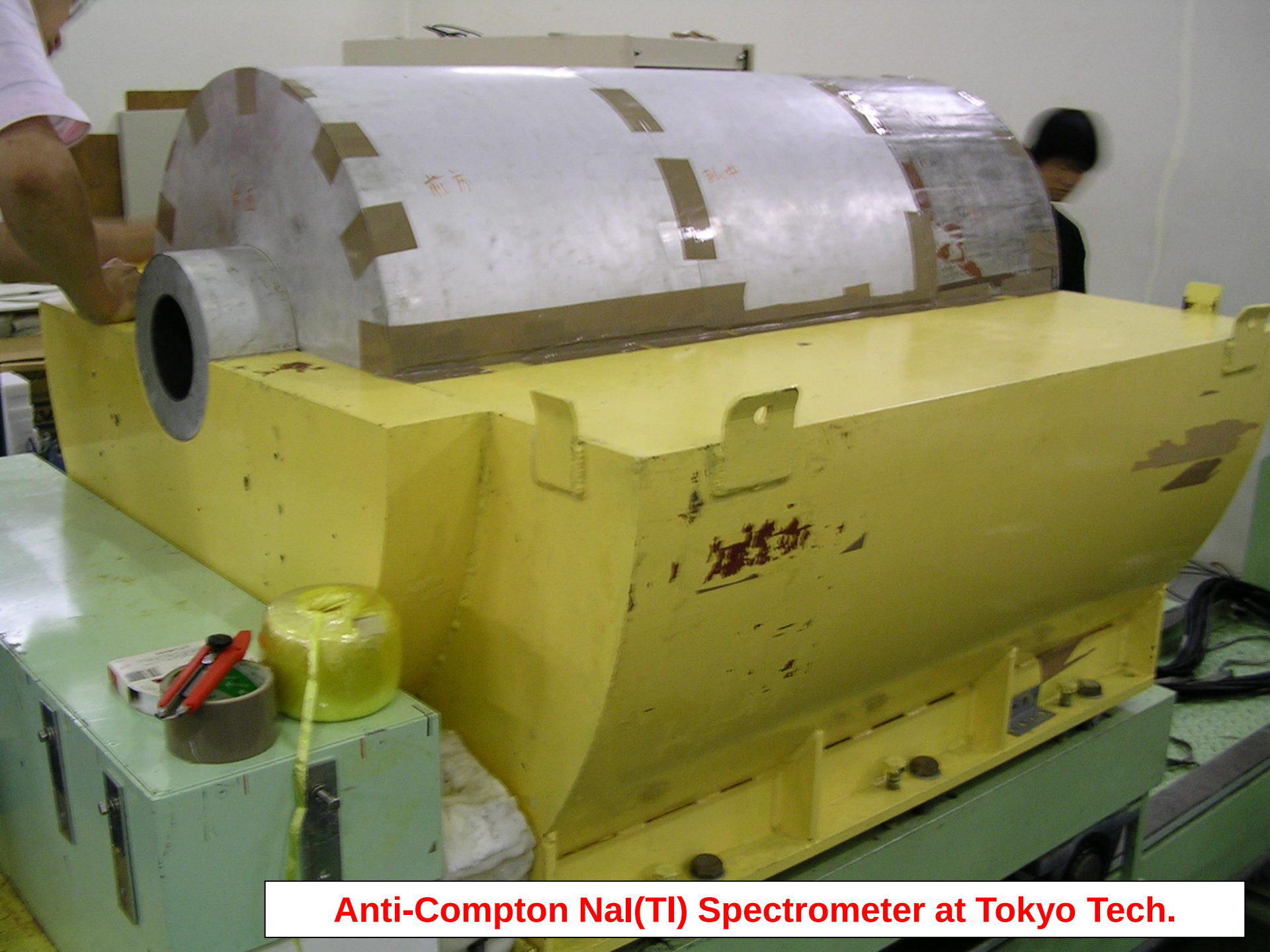
^{7}Li(p,n)^{7}Be Pulse Neutron Source

Ion Source: Duo-Plasmatron

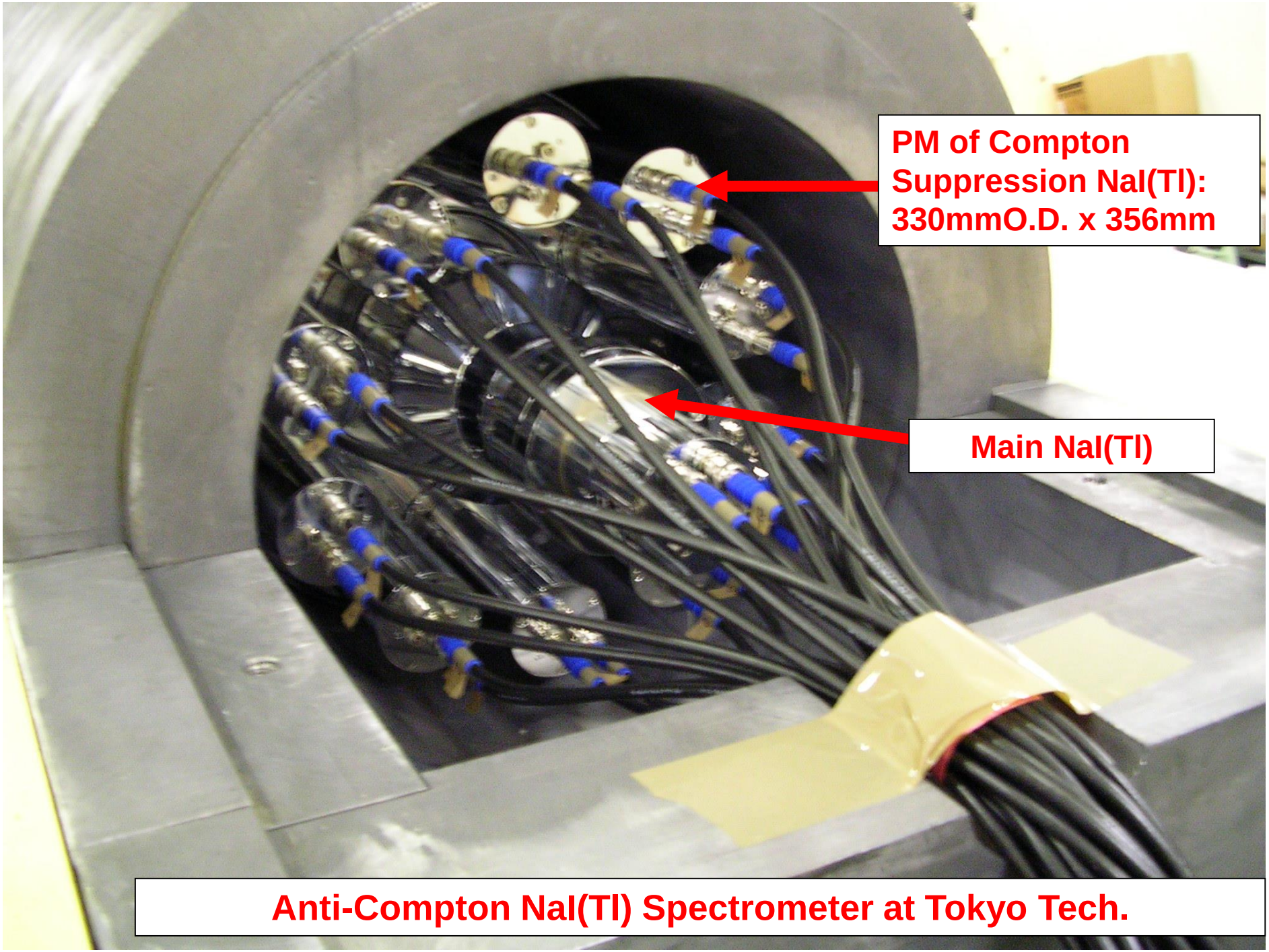
Power Supply for Pulsing System



Anti-Compton NaI(Tl) Spectrometer at Tokyo Tech.



Anti-Compton NaI(Tl) Spectrometer at Tokyo Tech.



Anti-Compton NaI(Tl) Spectrometer at Tokyo Tech.

東工大ペレトロンでの中性子捕獲実験

1978～ keV中性子捕獲ガンマ線スペクトル測定
1980　ビームのパルス化に成功
1990～ガンマ線スペクトル＋捕獲断面積測定
　＊ペレトロン：1991に大改修
　＊NaI(Tl)：3回改良
　→1980年の感度の**50倍**

※現在の測定感度
　＊全捕獲断面積：**0.2 mb･mol** @ 30 keV
　　（A＝100の試料1 gを用いると20mb迄測定可能）
　＊軽核の部分捕獲断面積：**5 μb･mol** @ 30 keV

東工大ペレトロンでの測定核種(1/5)

Z		A
1	H	1, 2
2	He	3, 4
3	Li	6, 7
4	Be	9
5	B	10, 11
6	C	12, 13
7	N	14, 15
8	O	16, 17, 18
9	F	19
10	Ne	20, 21, 22

Z		A
11	Na	23
12	Mg	24, 25, 26
13	Al	27
14	Si	28, 29, 30
15	P	31
16	S	32, 33, 34, 36
17	Cl	35, 37
18	Ar	36, 38, 40
19	K	39, 41
20	Ca	40, 42, 43, 44, 46, 48

東工大ペレトロンでの測定核種(2/5)

Z		A
21	Sc	45
22	Ti	46 - 50
23	V	50, 51
24	Cr	50, 52-54
25	Mn	55
26	Fe	54, 56, 57, 58
27	Co	59
28	Ni	58, 60, 61, 62, 64
29	Cu	63, 65
30	Zn	64, 66-68, 70

Z		A
31	Ga	69, 71
32	Ge	70, 72-74, 76
33	As	73
34	Se	74, 76-78, 80, 82
35	Br	79, 81
36	Kr	78,80,82,83,84,86
37	Rb	85, 87
38	Sr	84, 86,87,88
39	Y	89
40	Zr	90-92, 94, 96

東工大ペレトロンでの測定核種(3/5)

Z		A
41	Nb	93
42	Mo	92, 94-98, 10
43	Tc	99(RI)
44	Ru	96, 98-102, 104
45	Rh	103
46	Pd	102, 104-108, 110
47	Ag	107, 109
48	Cd	106,108,110-114,116
49	In	113, 115
50	Sn	112,114,115,116-120,122,124

Z		A
51	Sb	121,123
52	Te	120,122-126,128,130
53	I	127,129(RI)
54	Xe	124,126,128-132,134,136
55	Cs	133
56	Ba	130,132,134-137,**138**
57	La	138,**139**
58	Ce	136,138,**140**,142
59	Pr	**141**
60	Nd	**142**,143,144,145,146, 148,150

東工大ペレトロンでの測定核種(4/5)

Z		A
61	Pm	
62	Sm	144,146,147-150,152,154
63	Eu	151, 153
64	Gd	152,154-158,160
65	Tb	159
66	Dy	156,158,160,161-164
67	Ho	165
68	Er	162,164,166,167,168,170
69	Tm	169
70	Yb	168,170-174,176

Z		A
71	Lu	175,176
72	Hf	174,176-180
73	Ta	180,181
74	W	180,182-184,186
75	Re	185,187
76	Os	184,186,187,188-190,192
77	Ir	191,193
78	Pt	190,192,194-196,198
79	**Au**	**197(Standard)**
80	Hg	196,198-202,204

東工大ペレトロンでの測定核種(5/5)

Z		A
81	Tl	203,205
82	Pb	204,206,207,208
83	Bi	209
93	Np	237(RI)

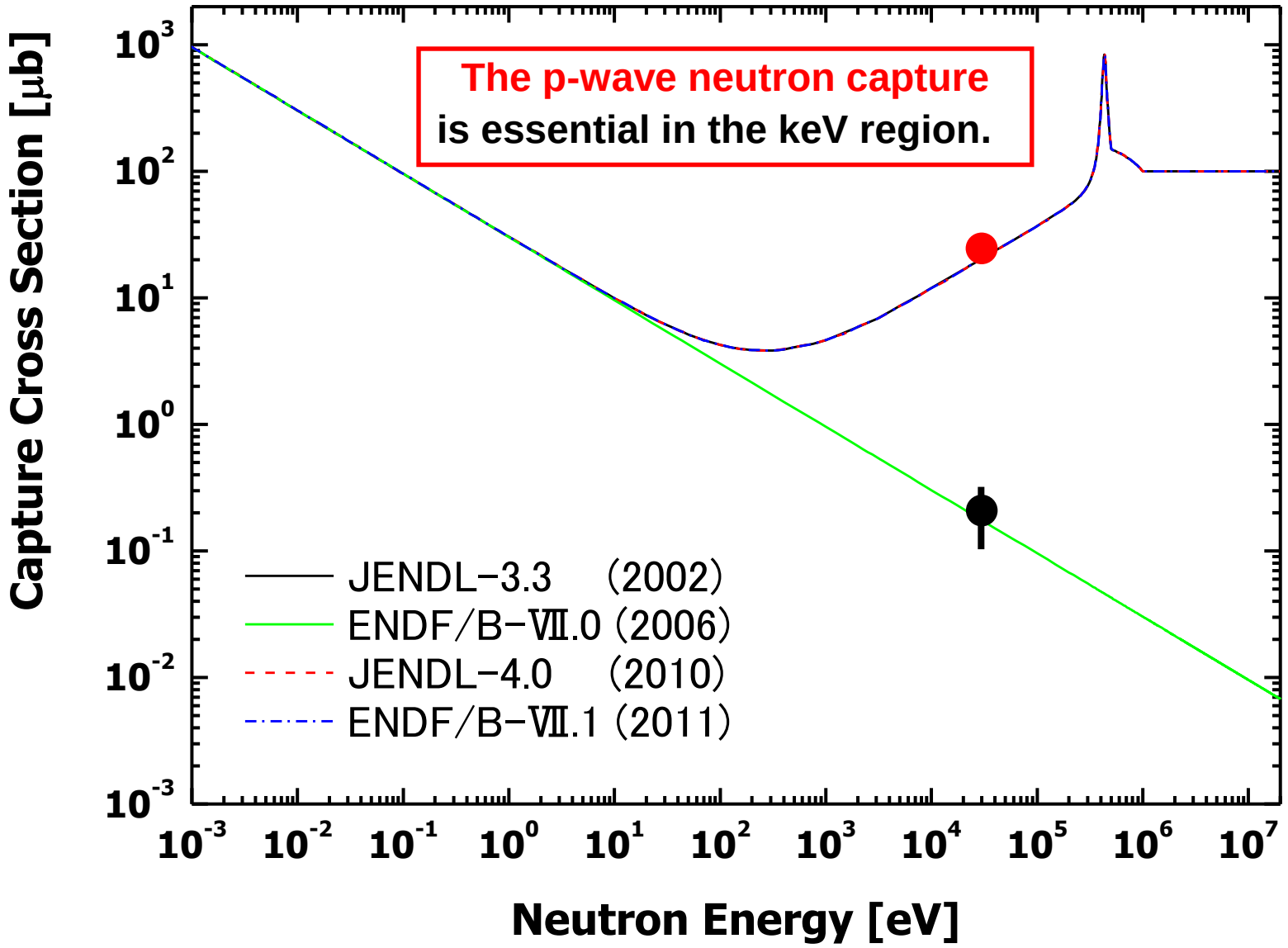
88核種の捕獲断面積測定

^{16}Oの捕獲断面積

測定値 @ 30 keV

0.2±0.1 μb (1971, Allen and Macklin)

24±4 μb (1995, Igashira et al.)



Impact of $^{16}O(n,\gamma)^{17}O$ Reaction on s Process

s Process Poisoning Effect on 25$M_\odot$ Very Old Star

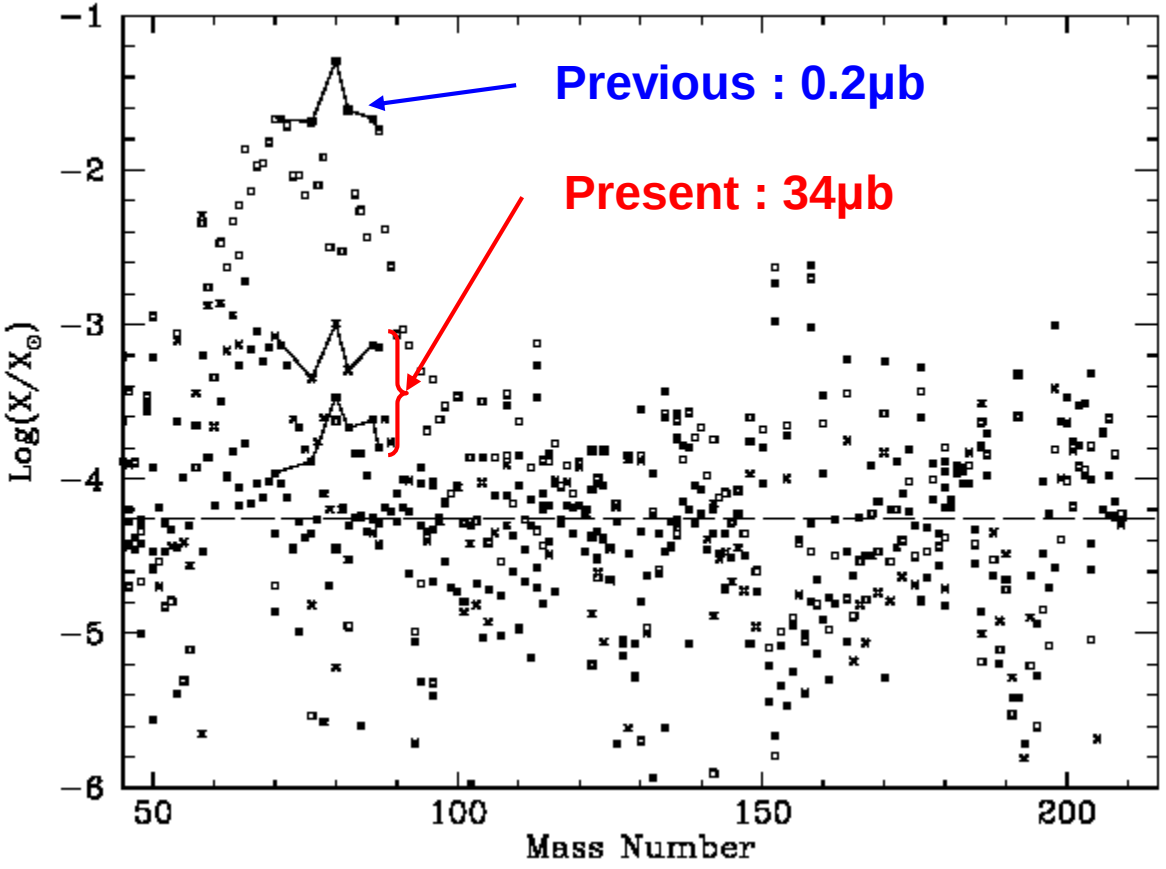


Fig. 2. Overabundances obtained at the end of core He burning for a metallicity $Z/Z_\odot = 10^{-3}$. The initial abundances of seed nuclei correspond to case B and are represented, relative to solar, by the dashed line. Open squares: $\sigma_{16} = 0.2\,\mu$b (Bao & Käppeler 1987); solid squares: $\sigma_{16} = 34\,\mu$b (Igashira et al. 1995); stars: idem with reduced $^{17}O\,(\alpha,\gamma)\,^{21}Ne$ rate. For clarity the six s-only nuclei referred to in the text (Sect. 3) are connected by straight lines

Ref. M.Rayet & M.Hashimoto, Astron. Astrophys., 354 (2000) 740-748.

Thank you for your attention!