WG#1 Strangeness Nuclear Physics experiments

by M. IEIRI & 25 participants

Letter of Intent (July 12, 2000) [http://jkj.tokai.jaeri.go.jp/NuclPart/Science.html]

- T. Nagae "Strangeness Nuclear Physics experiments at 50-GeV PS"
  - T. Fukuda "Double-Lambda at BNL"
  - K. Nakazawa "Next step on the coming hybrid experiment(AGS-E964) at JHF"
  - M. Ieiri "Hyperon-proton scattering experiment"
  - K. Tanida "Gamma-ray spectroscopy of hypernuclei"

- Y. Akaishi "Characteristic features of Strangeness Nuclear Systems"
- T. Yamazaki "Kbar-nucleus bound state spectroscopy"
- M. Iwasaki "Experimental search for Kbar-nucleus bound state"

- V. Kopeliovich "Multibaryons with Strangeness and Charm"
- E. Hiyama "Comments from the theoretical side"

- A. Sakaguchi "Feasibility of Production and Detection of Relativistic Hypernuclei "

- H. Noumi "Secondary beam lines"
- H. Hotchi "Possibility of moving the BNL-AGS D6 line to JHF"

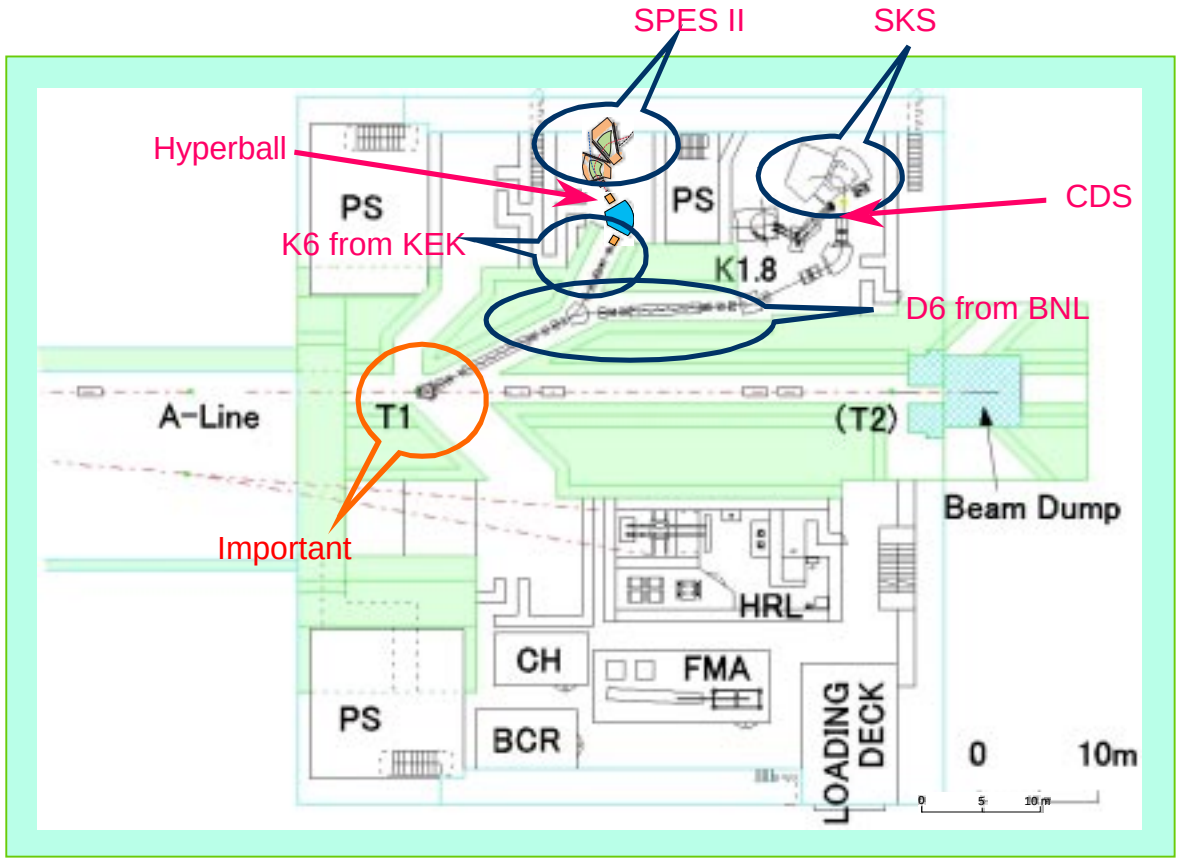
•Discussion

Subjects	Beamline	Specials	Beamtime	estimated counts	output
			(days)		
Spectroscopic Study of S=-2 Systems					
• Spectroscopy of Ξ Hypernuclei		upgraded SKS			
production of Ξ Hypernuclei	K1.8		20	~ 120 events/MeV/(^{208}Pb)	Ξ-N potential
production of ΛΛ Hypernuclei	K1.8		100	~ 60 events/peak	excited states of ΛΛ hypernuclei
• ΛΛ Hypernuclei by Sequential Pionic Decays	K1.8	CDS	not yet	-	g.s. mass of ΛΛ hypernuclei
• Double-Strangeness Nuclei by an Emulsion-Counter	K1.8	Emulsion	36	~ 10000 X stopping	B.E.
Hyperon Proton Scattering		Liq. H2 & CDS			
• Ξp→Ξp, ΛΛ	K1.8		100	2300, 550	direct input to BB strong interaction Models
• Asymmetry	K1.8		not yet	-	direct input to BB strong interaction Models
Hypernuclear γ-ray spectroscopy					
• Spectroscopy of Light and Heavy Hypernuclei		Hyperball			ΛN effective two-body interaction
$^{12}_{\Lambda}$C	K1.1		5	single ~10000, γγ ~100	
$^{12}_{\Lambda}$B	K1.1		30	single ~10000, γγ ~100	(CSB)
$^{208}_{\Lambda}$Pb	K1.8		5	~1000 /transitions	
• "Impurity N.P." - Nuclear Structure Change Induced by Λ					
$^{7}_{\Lambda}$He	K1.1		10	330 E2 γ-rays	Λ in neutron-skin
$^{20}_{\Lambda}$Ne	K1.1		a few	1000-10000 ?	spectroscpoy & effective ΛN spin-dependent int.
• B(M1) : g-Factor of Λ in Nuclear Matter; $^{12}_{\Lambda}$C	K1.1		17	~ 15000	size of baryon in nuclear matter
• Spectroscopy of ΛΛ Hypernuclei					
$^{4}_{\Lambda\Lambda}$H	K1.8		10	~ 3100, γγ ~110	ΛΛ spin-orbit force
$^{13}_{\Lambda\Lambda}$B	K1.8		10	~ 100	ΛΛ spin-orbit force
• Spectroscopy of neutron-rich Hypernuclei	?		not yet		
• Ξ$^-$-atom X-ray	K1.8				Ξ$^-$ nucleus interaction
High Resolution Reaction Spectroscopy of S=-1Hypernuclei		HRBL			
• Fine structure of Λ-single particle potential; $^{90}_{\Lambda}$Zr	K1.8		10	~ 1700 for g.s.	further decomposition of spin-orbit splitting
• Precision spectroscopy of light hypernuclei; $^{12}_{\Lambda}$C	K1.8		10	~ 1000	check of inter-shell mixed configuration
• Spectroscopy of neutron-halo Λ hypernuclei; $^{12}_{\Lambda}$Be	K1.8		10	~ 200	Λ-neutron interaction
• Spectroscopy of Σ hypernuclei; $^{208}_{\Sigma}$Hg	K1.8		10	~ 100	
Kbar-nucleus bound state spectroscopy	K1.1				hadron dynamics in cold dense matter
Hypernuclei production with Heavy Ion					Life time, decay, size

General

K-Hall

- Plan View (1st Stage)



•Discussion

- ➪ Layout (K1.8 first ••• OK)

- ➪ Try to get external funds (e.g. Kaken-hi) to construct a part of secondary line & detectors …
  D6@BNL & K6@KEK to 50 GeV

- ➪ Collaboration
  To start, KEK-staffs in this group (Nagae, Noumi and me) will work as an information center.

  We can wave collaborators to work/ask something.