



The 7<sup>th</sup> International Workshop on Accelerator Operation

# Training syllabus for RIKEN NISHINA Center

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# RI Beam Factory (RIBF)



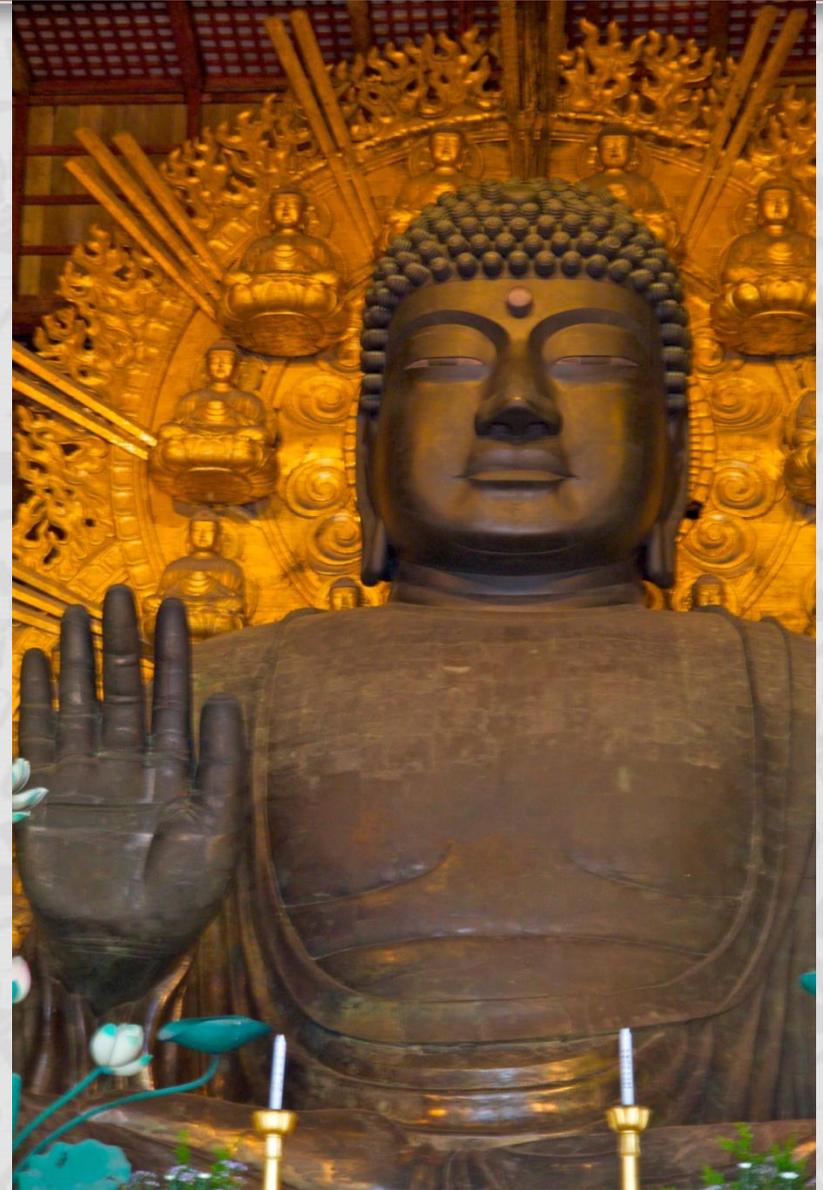
# SRC is the World's Biggest and Most Powerful



Comparative table for large size Cyclotrons				
	RIKEN IRC	<b>SRC</b>	Osaka Univ	Michigan NSCL
Type	Ring Cyclotron	Ring Cyclotron	Ring Cyclotron	AVF
K-Value	950	<b>2500</b>	400	1200
Sector number	4	6	6	3(hill)
Magnetic field (Tesla)	1.9	4	1.75	3—5
Main coil	Normal conductor	Super conductor	Normal conductor	Super conductor
Frequency (MHz)	18—38	23—46	30—52	9—27
Weight (ton)	2400	<b>8400</b>	2200	240

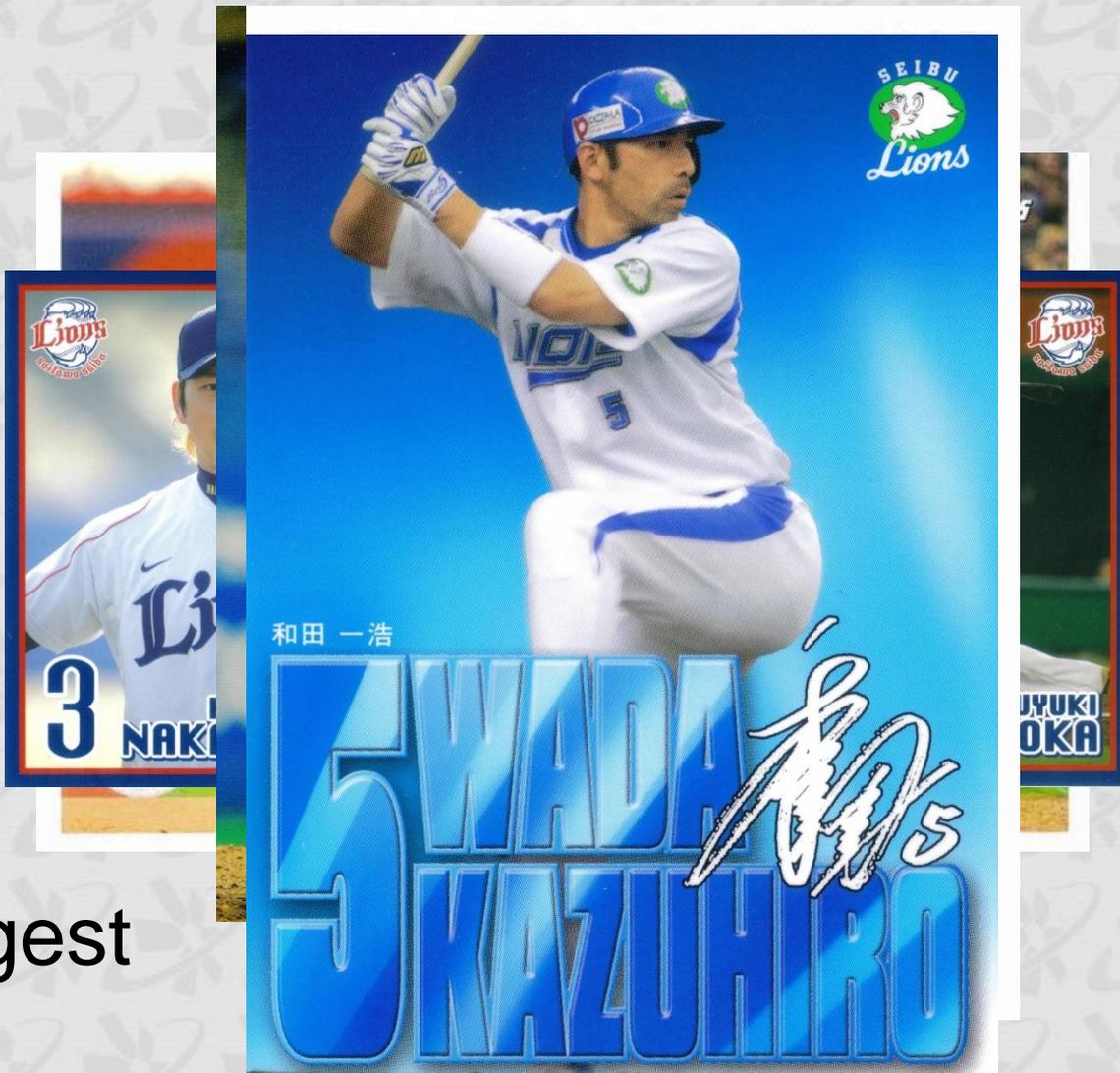
# DAIBUTSU of Nara (Big Buddha)

- The giant statue of Buddha in Nara.
- Big but not the strongest.



# World Baseball Classic

- 2005 champion
- 2009 champion
- Best not the biggest



# Yamato class battleship



### Battleship YAMATO class vs. IOWA class

	IOWA	YAMATO
Standard displacement (ton)	48,500	64,000
Board armer (mm)	325	410
Gun turret amer (mm)	495	650
Bore of Main gun (cm)	40.64	46.0
Cannon ball (ton)	1.2	1.5



# Cannonball

Iowa class 1.2t    Yamato class 1.5t



- 40 experimenters
- Operators
  - 1) Accelerator 2 out of 18
  - 2) CGS 3 out of 10
  - 3) He chillers 1 out of 8

- **Legally required for every one:**
  1. Radiation worker for radiation control area
  2. Guidance training
  3. Special training for low voltage electrical handling  
(Not more than 600V AC or 750V DC)

# Special training for low voltage handling



- Medium voltage electrical handling (6.6kV)



25kAVCB

- Liquid nitrogen handling
- Machine tool operation
- Scaffolding work

- Crane operation and sling work
  1. Not for crane of less than 1 ton
  2. Special training for crane less than 5 ton
  3. Skill training for pendant crane
  4. License for overhead crane (wireless)

# Skill training for pendant crane



# OJT for operators

- Senior associate trains the freshman
- Senior and freshman make up a pair
- Classroom lectures for the freshman



- Cogeneration (CGS) was not in operation when lightning struck (CGS works only when thermal load increases)
  - 1) Operator pushed the start button of CGS when thundercloud approached but CGS started to turn only .

- (Gas turbine generator needs enough turning before start)
- 2) The manual was revised so that CGS will start to turn when thundercloud appears on the monitor display in the control room
- 3) With this revision, CGS now works as UPS for important loads

- CGS control rooms monitored instant voltage drop by under voltage relay(27)  
there are 4 control rooms
  - 1)When 27 the alarm went off, CGS operator only reset the relay
  - 2)After one hour,He in small He refrigerators started to evaporate and the operator of He chiller recognized trouble

- The manual was revised so that when instant voltage drop occurs, operator must call all control rooms to inform.
- When informed, the operators should check the range of defense

- **Safety first !**
- Up to now, there was no accident that led to injury or death

- RILAC-2 : New Injector, Riken ion linac
- SCRIT : Self-Confining Radioactive Ion Target
- SAMURAI: Superconducting Analyzer for Multi-particle from Radioactive Isotope
- SHARAQ: Spectroscopy of hadronic system with radioactive quantum beam