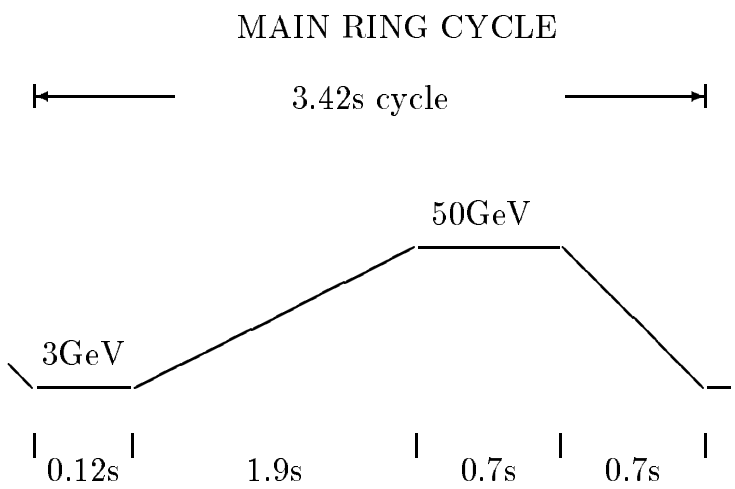

Slow Extraction for kaon experiments

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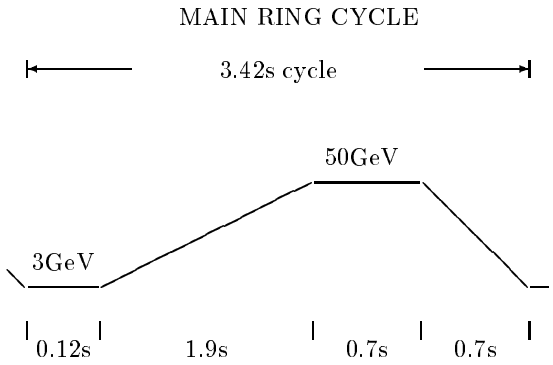
3 August 2004 J-PARC NP04 workshop @Tokai "RICOTTI"

- intensity: 200×10^{12} protons per spill
- cycle: every 3.42 sec
- spill length at flat-top: 0.7 sec
  - duty factor $= 0.7/3.42 = 0.20$ (or 20%)



integrated beam intensity: <u>average current</u>

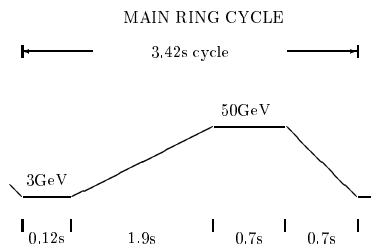
$$200 \times 10^{12} \bullet 1.6 \times 10^{-19} \text{ Coulomb} / 3.42 \text{ sec} = 9.4\ \mu\text{A}$$

$$\boxed{1\ \mu\text{A} \equiv 370 \times 10^{12} \text{ protons } \textbf{per minute}}$$

instantaneous beam intensity: <u>instantaneous rate</u>

$$200 \times 10^{12} / 0.7 \text{ sec} = 286 \times 10^{12}\ \textbf{Hz} \text{ protons}$$

J-PARC 50GeV-PS operation (Slow Ext)



	KEK-PS	BNL-AGS	J-PARC	J-PARC mod (NP02)	
proton energy	12	24	50	30	GeV
protons per pulse	2.5	65	200	100	$\times 10^{12}$/spill
cycle	4.0	6.4	3.42	4.42	sec
average current	0.1	1.63	9.4	3.6	μA
beam spill	2.0	4.1	0.7	1.7	sec
duty factor	0.50	0.64	0.20	0.39	
instantaneous rate	1.3	16	286	59	$\times 10^{12}$ Hz

new Slow Ext operation

	KEK-PS	AGS	J-PARC high duty-cycle				
proton energy	12	24	30				GeV
protons per pulse	3.5	65	100	200	100	200	10^{12}/spill
cycle	4.0	6.4	5.63		10.0		sec
average current	0.1	1.63	2.84	5.68	1.6	3.2	μA
beam spill	2.0	4.1	3.0		7.0		sec
duty factor	0.50	0.64	0.56		0.70		sec
instantaneous rate	1.3	16	33.3	66.7	14.3	28.6	$\times 10^{12}$ Hz