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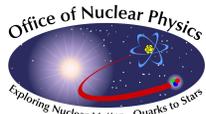
# e-polarization in ELIC

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Workshop on Future Prospects in QCD at High Energy  
Joint EIC2006 & Hot QCD Meeting

July 17-22, 2006  
Brookhaven National Laboratory



Thomas Jefferson National Accelerator Facility

Page 1

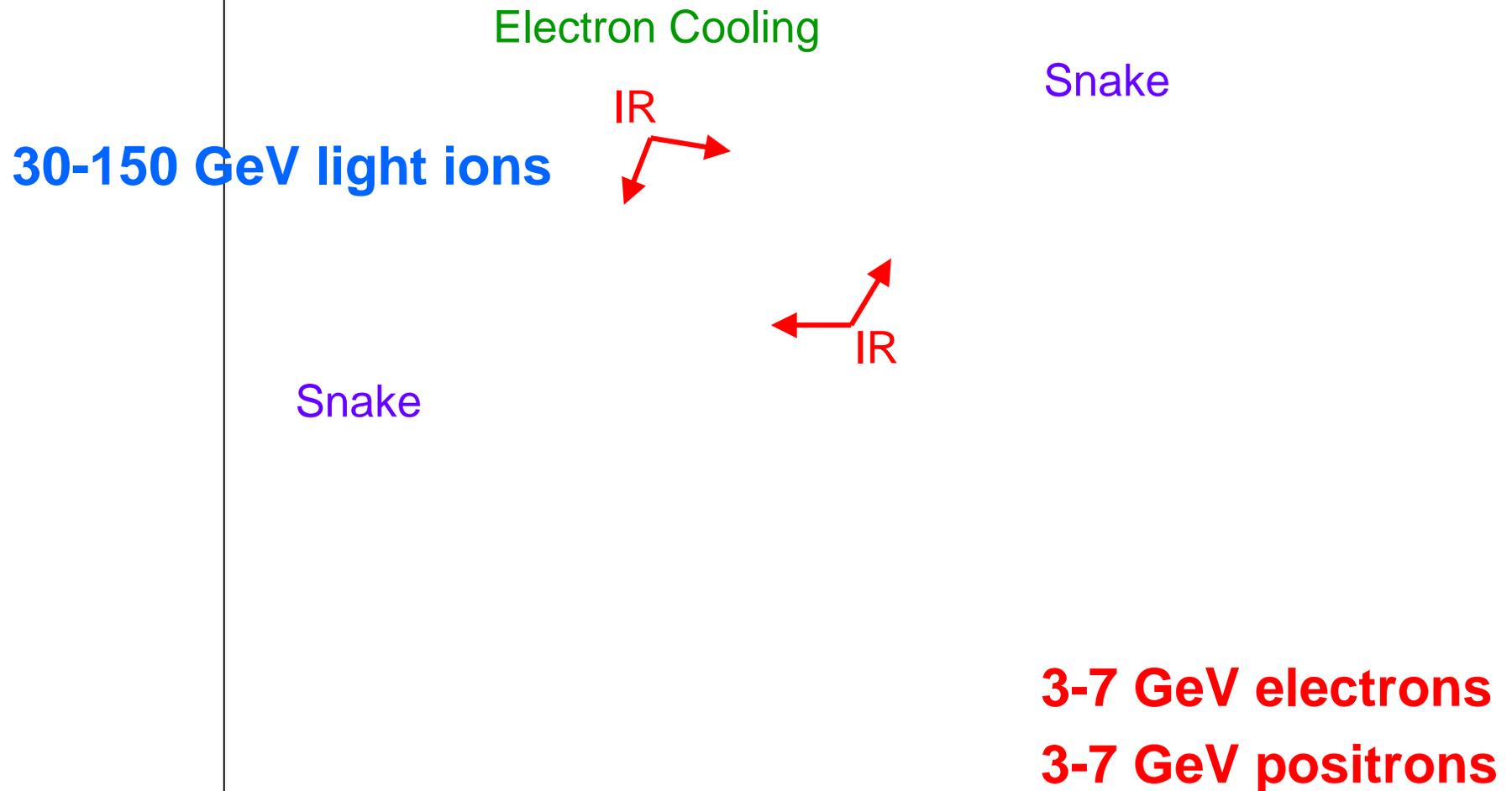


# Outline

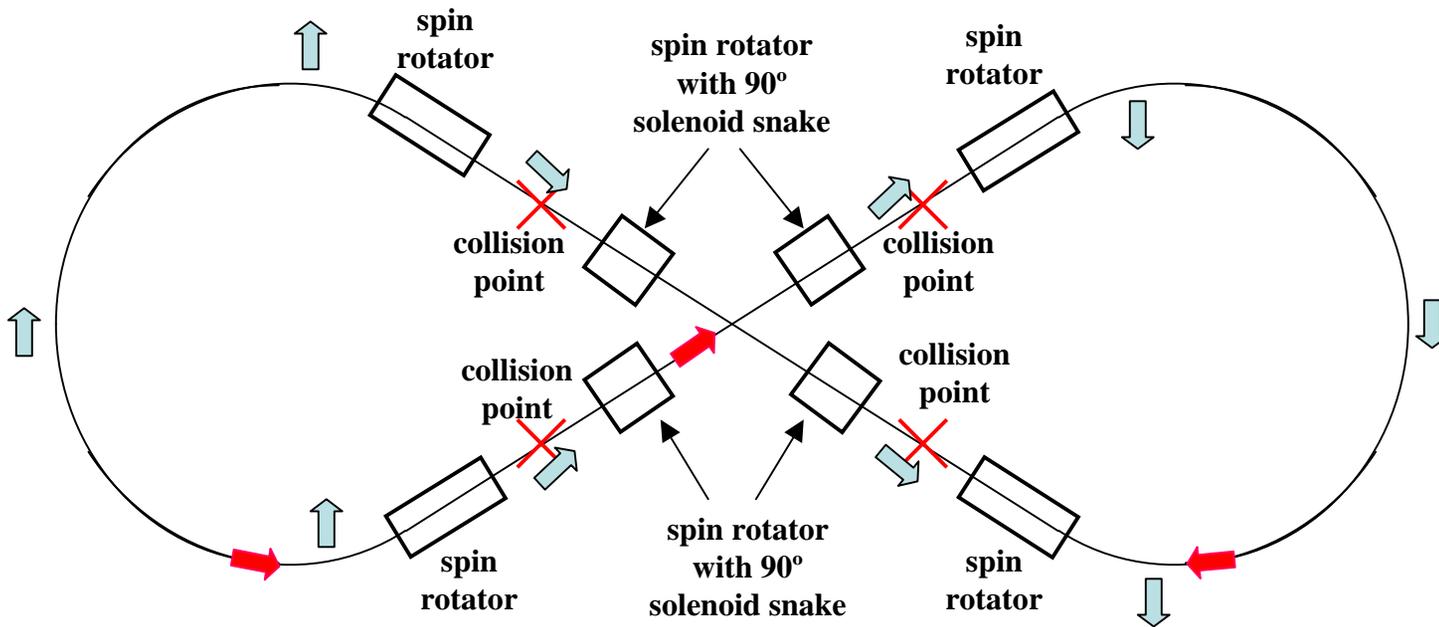
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- New ELIC design
- e-spin in figure 8 ELIC
- Spin global stability
- Spin rotation in IR
- Radiation effects
- Polarized electrons in ELIC
- ST polarization for positrons
- Flipping spin
- Summary

# ELIC ring-ring design

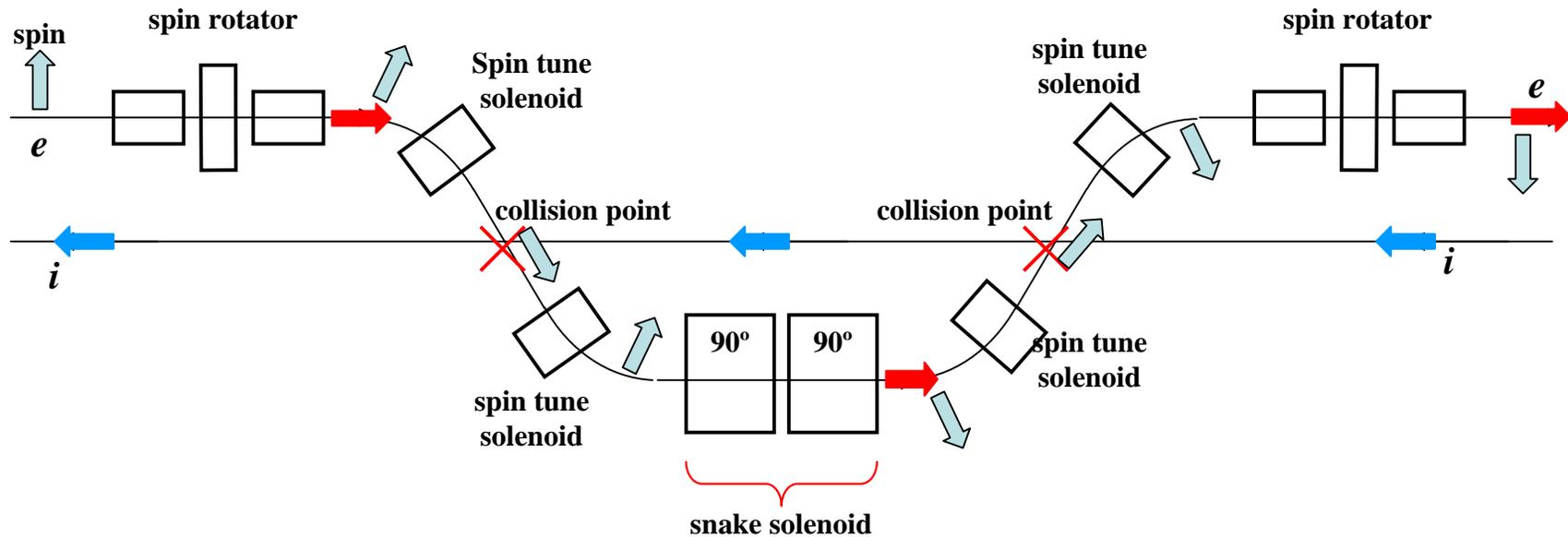


# e-spin in figure 8 ring



**Spin injected vertical in arcs (using Wien filter).  
Self-polarization in arcs to maintain injected polarization.  
Spin rotators matched with the cross bends of IPs.**

# Spin rotation in IR

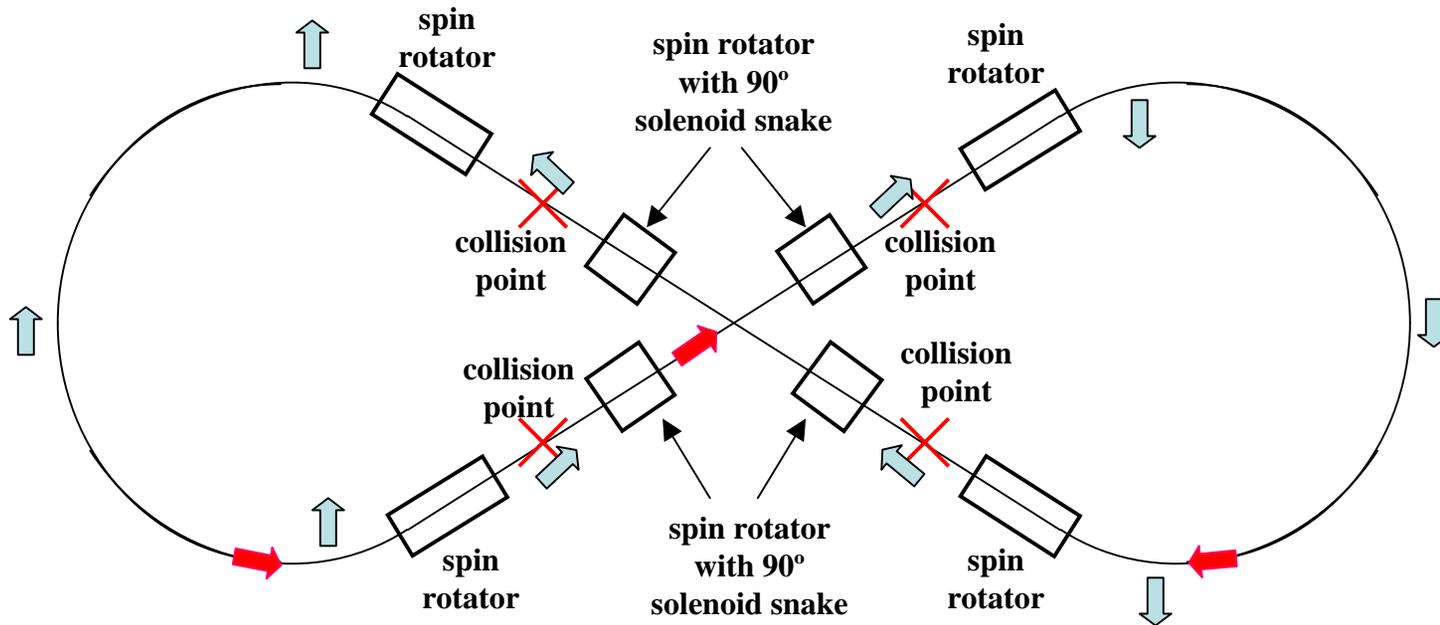


Rotation of spin from vertical in arcs to longitudinal at IP:

- Beam crossing bend causing energy-dependent spin rotation, together with

- **Energy-independent orbit** spin rotators [two SC solenoids with bend in the middle] in the arc and after the arc.

# Self-polarization



## Sokolov-Ternov polarization for positrons

Vertical spin in arcs

4 IP's with longitudinal spin

Polarization time is 2 hrs at 7 GeV – varies as  $E^{-5}$  (can be accelerated by introduction of wigglers or polarizing at maximum energy).

Quantum depolarization in spin rotators -> **Equilibrium polarization  $\leq 90\%$**

# e<sup>-</sup> / e<sup>+</sup> Polarization Parameters

Parameter	Unit			
Energy	GeV	3	5	7
Beam cross bend at IP	mrad	70		
Radiation damping time	ms	50	12	4
Accumulation time	s	15	3.6	1
Self-polarization time <sup>*</sup>	h	20	10	2
Equilibrium polarization, max <sup>**</sup>	%	92	91.5	90
Beam run time	h	Lifetime		

**\*One e-folding. Time can be shortened using high field wigglers.**

**\*\*Ideal max equilibrium polarization is 92.4%. Degradation is due to radiation in spin rotators.**