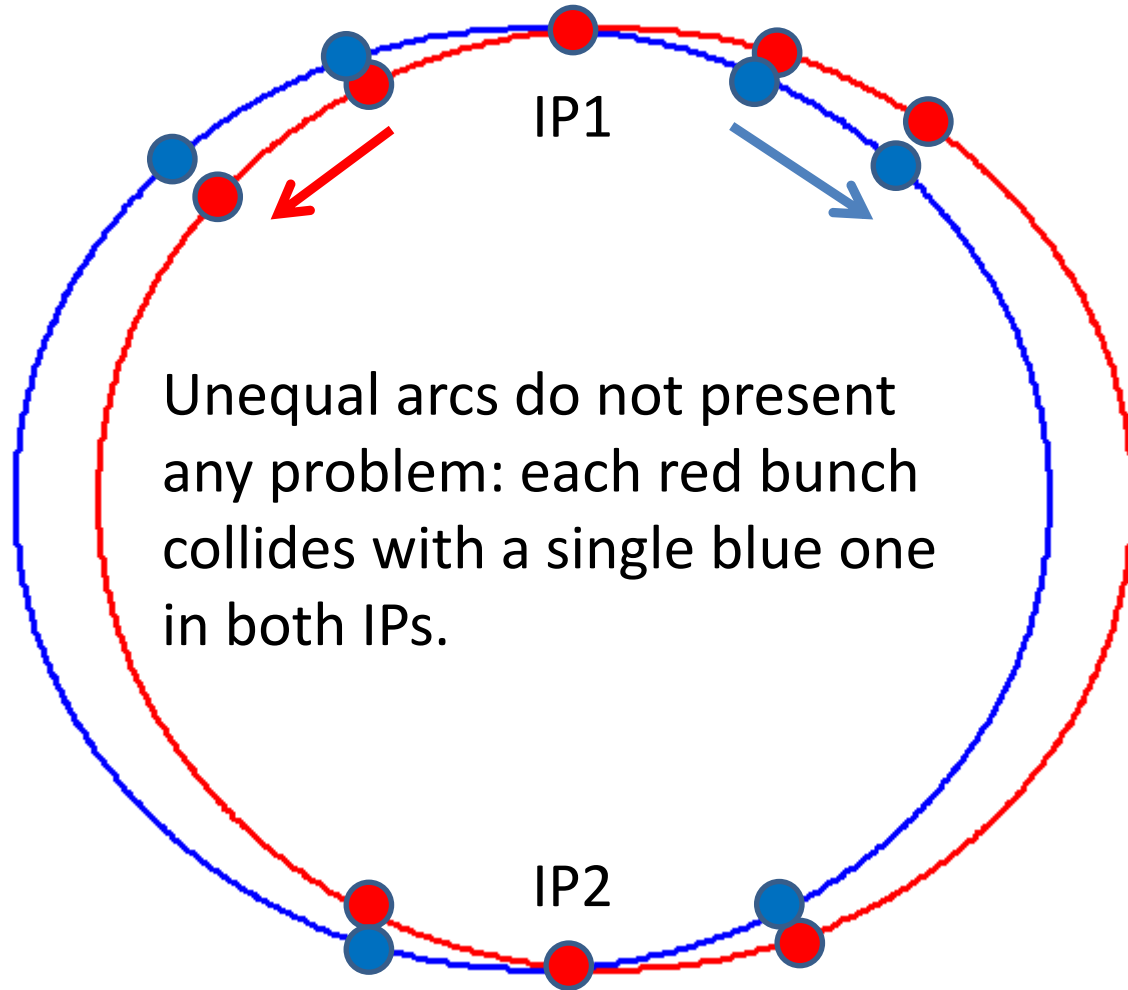


# Bunch trains structure in FCC-ee

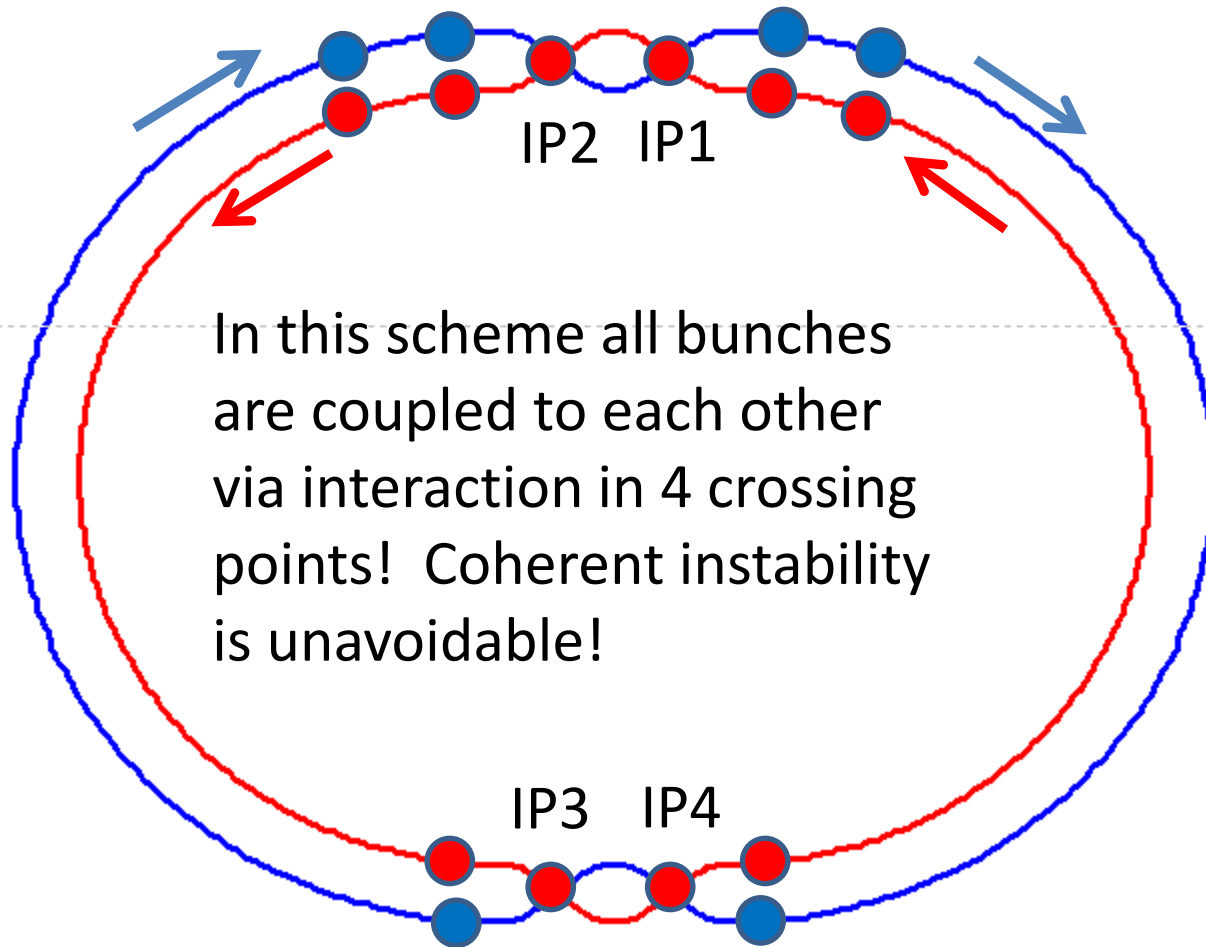
## I.Koop, BINP, Novosibirsk

CERN, 05.12.2014

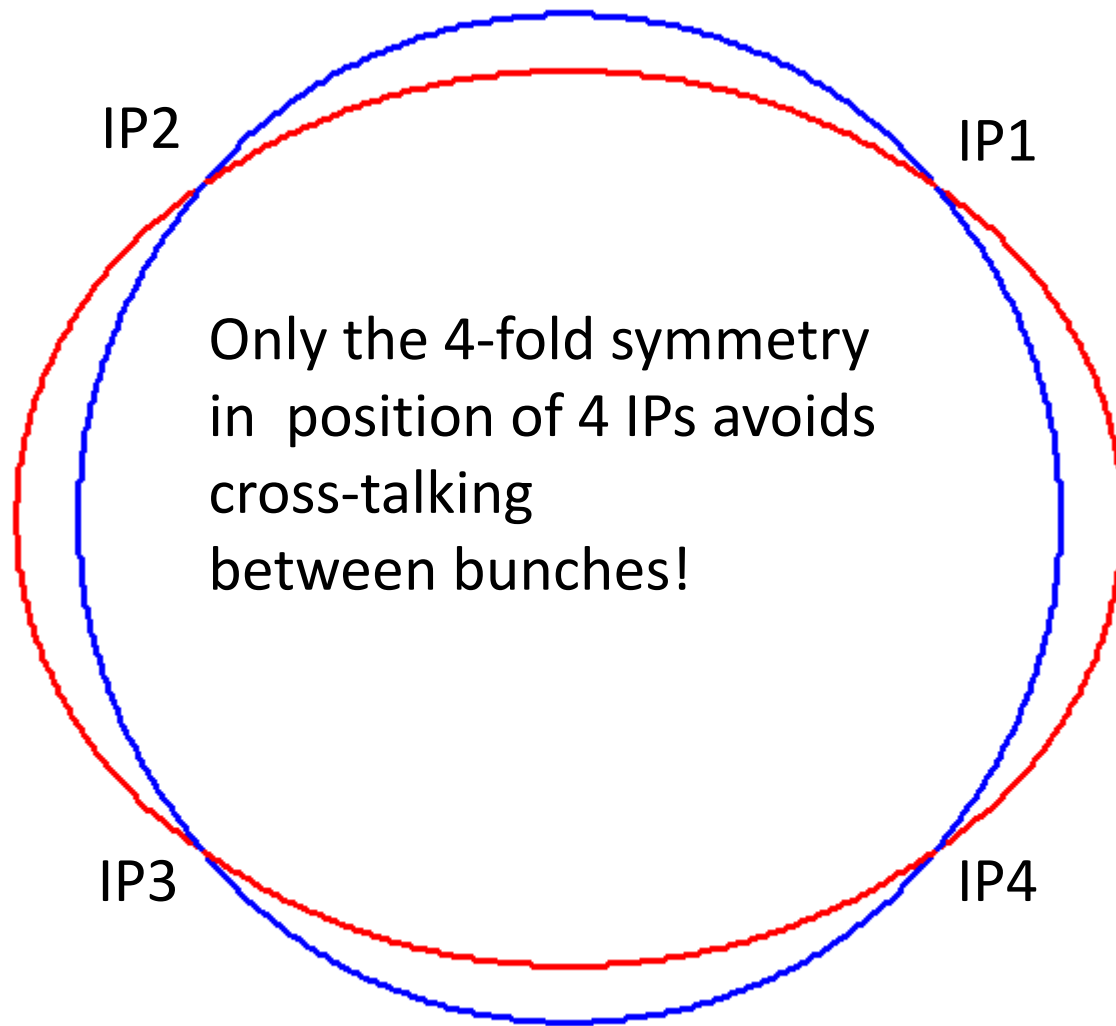
# Collision in 2 IPs



# Collision in 2+2 IPs



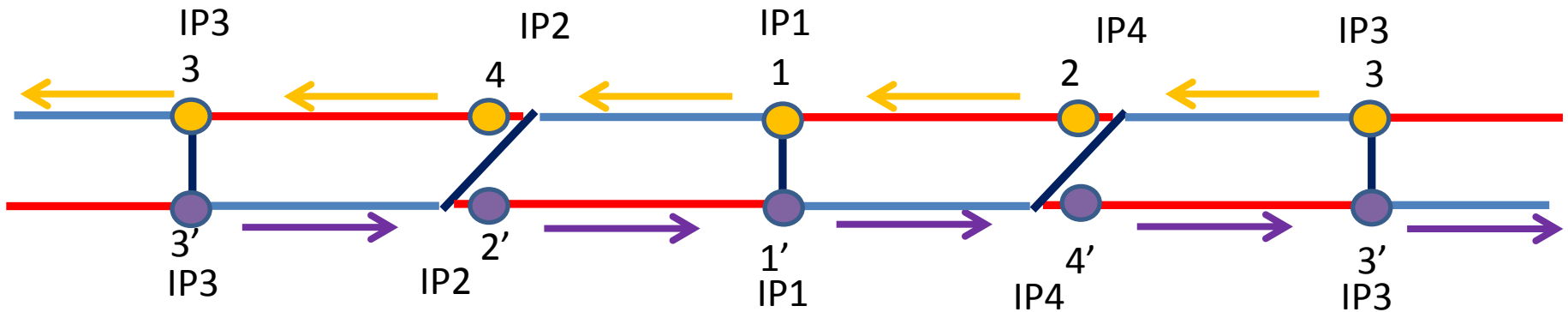
# Symmetric intersection of 2 rings in 4 IPs



# Collision of two trains of 4 bunches.

Snap shot of two groups of bunches spaced by  $\frac{1}{4}$  of a ring period:

- long and short paths between IPs interchange each other
- collisions at IP2 and IP4 happen slightly early than at IP1 and IP3



Collision sequence of odd bunches:

Bunch 1	Bunch 3	Bunch 1'	Bunch 3'
1-1'	3-3'	1'-1	3'-3
1-3'	3-1'	1'-3	3'-1
1-1'	3-3'	1'-1	3'-3
1-3'	3-1'	1'-3	3'-1

Bunches 1 and 3 collide with 1' and 3'.

They are fully isolated from similar groups of other bunches!

Same situation with the even numbers.

Bunches 2 and 4 are coupled to 2' and 4', only!