

# For Overall Beam Line Layout Choices

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*Presentation in WG1(with minor change)  
+ Comments from Kirk T. McDonald (Princeton U.).*

# *Possible Beam Line Layout of ILC-(A)*

Layout based on following choices.

## Positron source:

Prepare both conventional and undulator based.

Probably, start with conventional and prepare space for undulator

Place the undulator at Ebeam = 150 GeV (USTOS)

## Damping Ring:

Dogbone DR, sharing tunnel with Main Linac.

Avoid DR - Main Linac interference in the first stage.

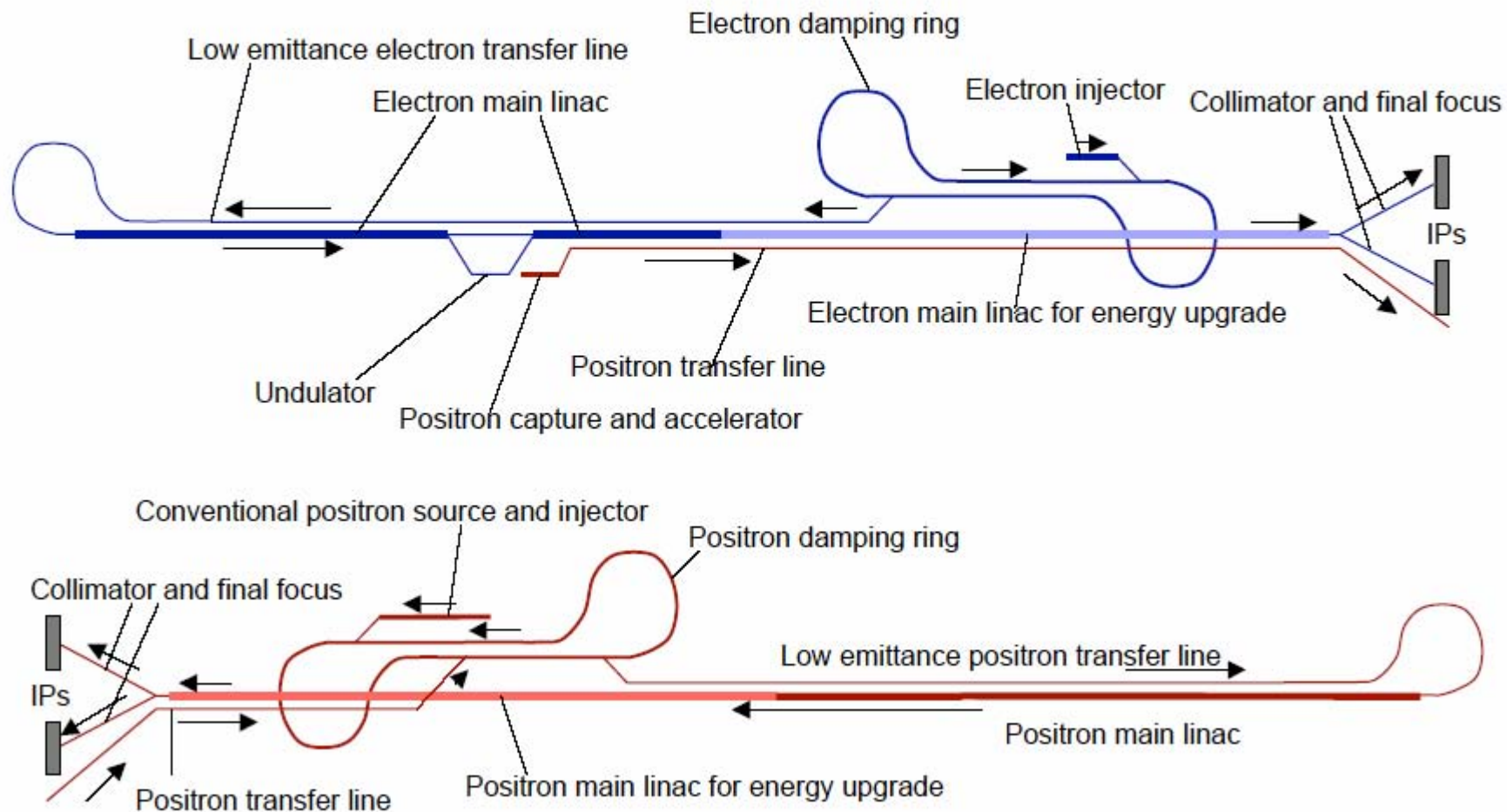
(Oide - scheme)

## Turn Around: (Automatically given from above two options.)

180 degree turn around after damping rings.

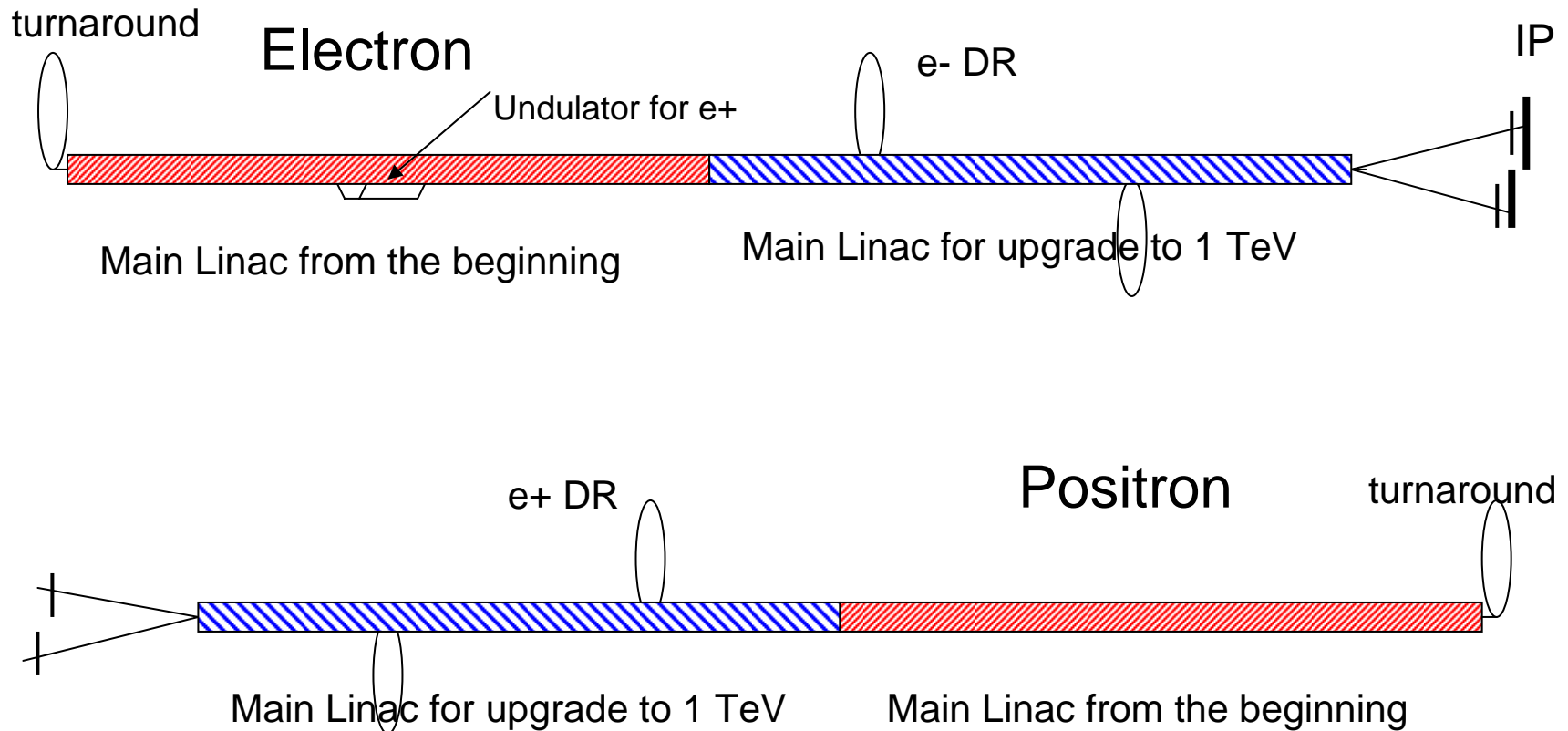
This scheme allows orbit feed-forward after DR.

# Schematic Layout of Beam Line (Conventional and Undulator $e^+$ source)



# Energy upgrade scheme

No DR-ML interference in the first stage. (Oide - scheme)



## *Possible Beam Line Layout of ILC-(B)*

### Layout without undulator based e<sup>+</sup> source

#### Positron source:

Conventional.

#### Damping Ring:

Dogbone DR, sharing tunnel with Main Linac.

Avoid DR - Main Linac interference in the first stage.

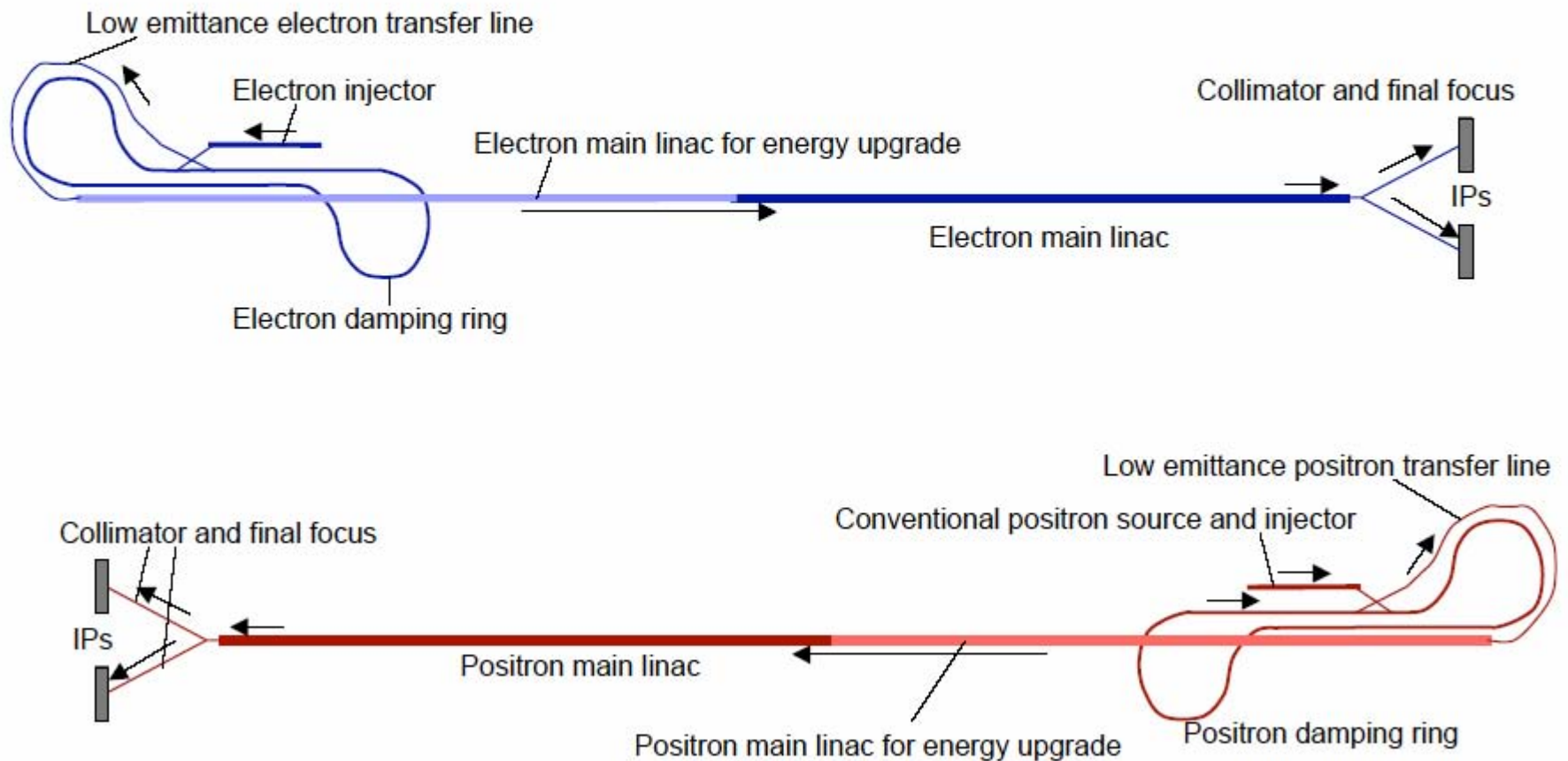
(Oide - scheme)

#### Turn Around:

180 degree turn around after damping rings.

This scheme allows orbit feed-forward after DR.

# Optional Schematic Layout of Beam Line -(B) (No Undulator e<sup>+</sup> source. With Oide-scheme)



## *Possible Beam Line Layout of ILC-(C)*

Layout without undulator based  $e^+$  source  
Without Oide-scheme

Positron source:

Conventional.

Damping Ring:

Dogbone DR, sharing tunnel with Main Linac.

Empty tunnel for 500 GeV ECM operation.

(It allows major preparations for upgrade during operation.)

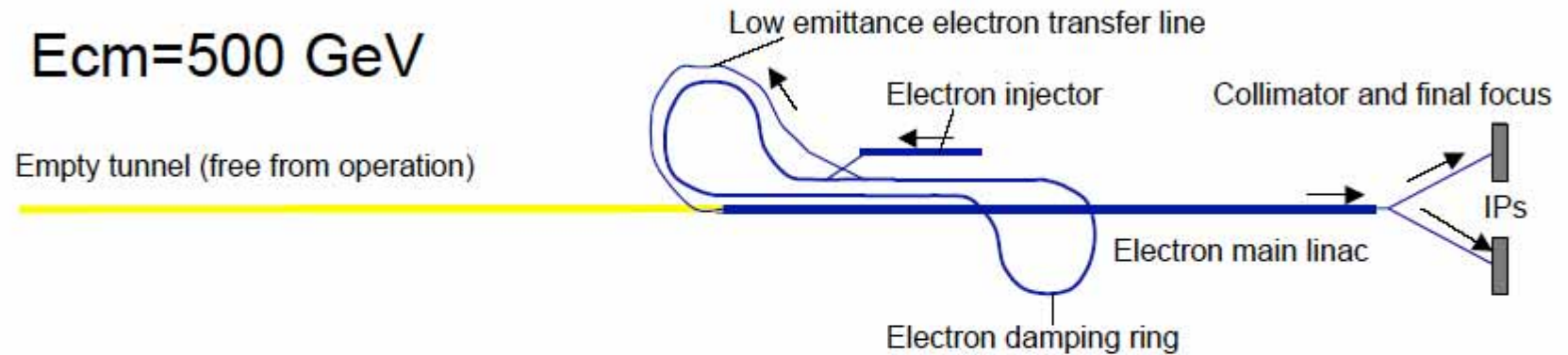
Turn Around:(Automatically given at 1 TeV.)

180 degree turn around after damping rings.

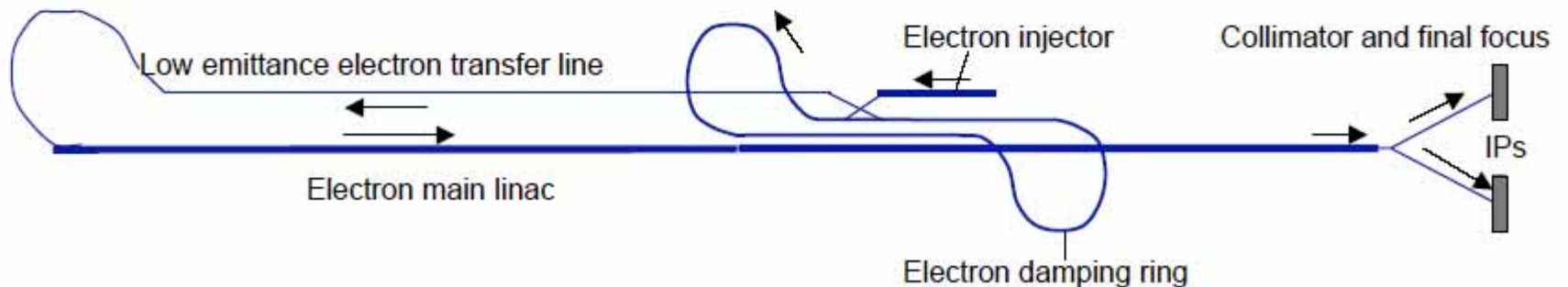
This scheme allows orbit feed-forward after DR.

Optional Schematic Layout of Beam Line -(C)  
(Electron line is shown. Positron line is similar.)  
(No Undulator  $e^+$  source, without Oide-scheme)

$E_{cm}=500$  GeV



$E_{cm}=1000$  GeV





## *There are many other options*

- Independent DR tunnels (will Linac layout (C) attractive)
- Undulator near IP
- etc.

## *Decision will be based on:*

- Choice of e<sup>+</sup> source technology
- DR design,
- Beam dynamics
- Commissioning and Availability consideration (DR-ML sharing tunnel or not)
- Overall cost

# *What should be considered from LET Beam Dynamics (WG1) point of view*

Low Emittance Preservation in:

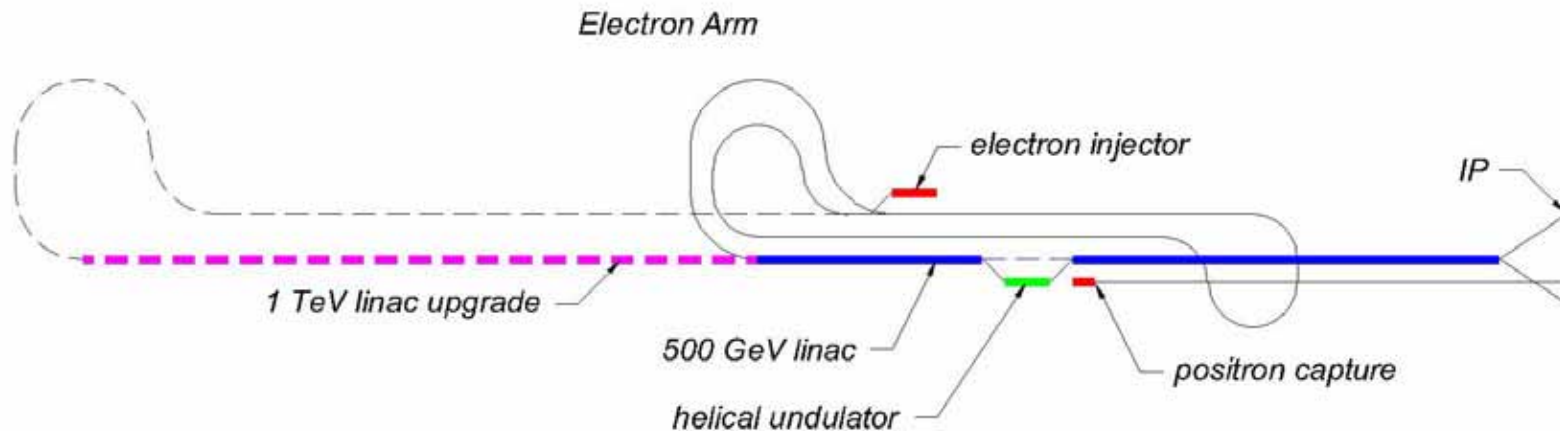
- **Low Emittance Turn Around** after DR

This is essential for Feed Forward which allow reasonable stability tolerance of extraction kicker of DR. Need to design.

- **Long, Low Energy, Low Emittance Transport** in Layout (A) (before turn around) and Layout (B)(after turn around)
- DR-ML field interference (probably WG3b issue)

*Comment and figures from Kirk T. McDonald (Princeton).*

*Helical undulator source will work both 150 and 400 GeV beam energy.*



*Undulator source can use  $e^+$  beam.*

Operation of  $e^-$  and  $e^+$  can be independent.

No lone  $e^+$  transport.

