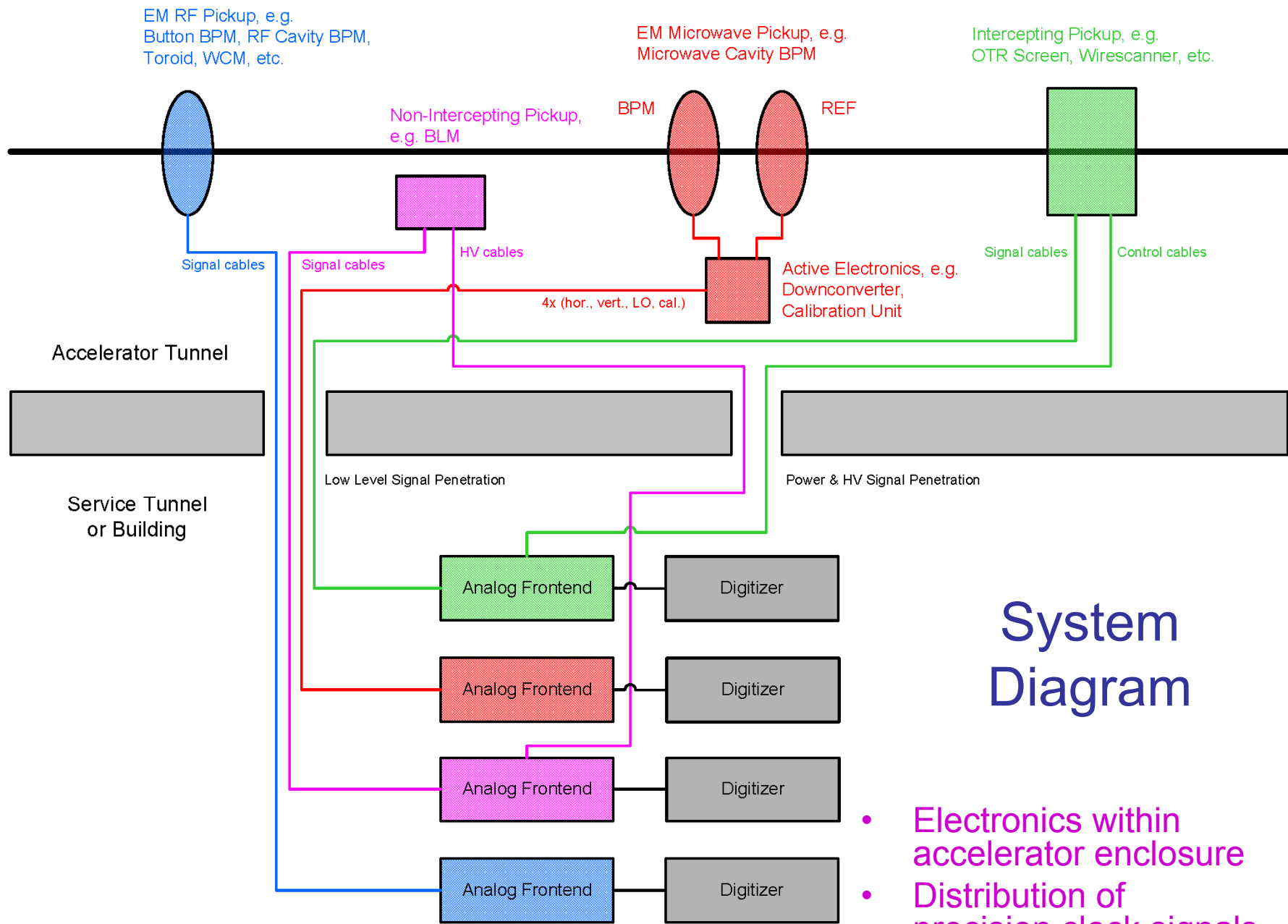


# RDR Technical Systems Instrumentation

- *BPM*
- *Profile monitors*
- *Phase, toroid, wall current*
- *Special (DR)*
- *Loss monitors*
- *Feedback – P. Burrows*
- Instrument system diagram
- Area layout
- Specifications
- Summary with totals and costing approach

M. Wendt, S. Smith, J. Urakawa,  
P. Burrows, G. Blair, M. Ross



- Electronics within accelerator enclosure
- Distribution of precision clock signals

# Project construction model similar to Brian Chase (LLRF)

- In-house design (possibly commercial)
- contract printed circuit assembly and test
- contract pre-termination of cables
- rack factory managed by lab staff

Laserwires			
	IP	Laser	Detector
e <sup>-</sup>	8	1	2
e <sup>+</sup>	5	1	2
DR	3	3	3
RTML	20	4	6
Linac	16	4	10
BDS	18	4	6
	70	17	29

Where does the information come from:

e<sup>-</sup> Axel

e<sup>+</sup> John and Vinod

DR 1 per ring

RTML rdr wiki listing

Linac 3 cryo breaks (1 IP/each) + undulator/e<sup>+</sup> insertion (5 IPs/each)

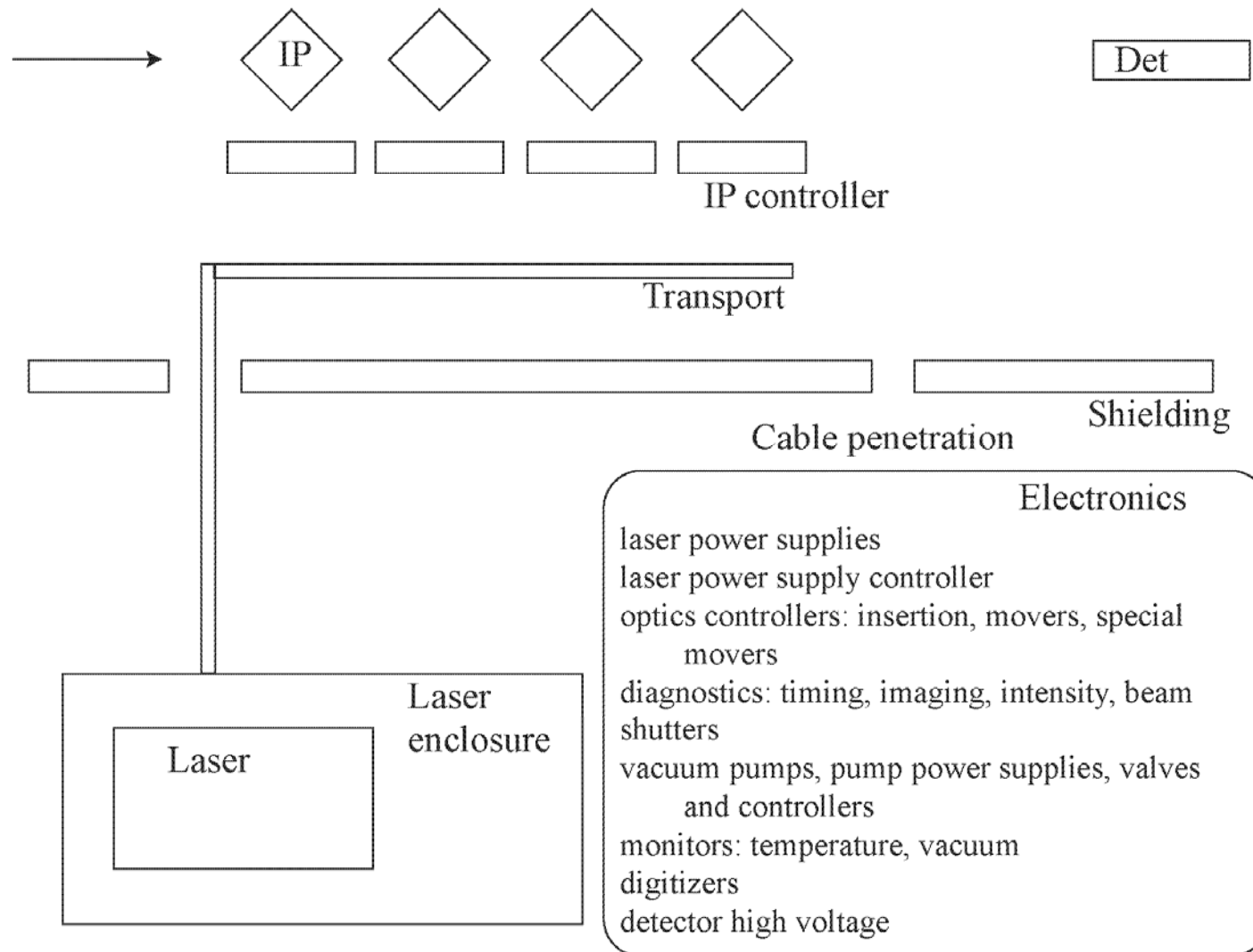
BDS rdr wiki listing

Laserwire basics:

1. Laser (one can feed many IP's)
2. Distribution
3. Deflector (scanner)
4. IP (multi-plane)
5. e/γ Separation
6. Detector (one can be used for many IP's)

There will be a laserwire meeting July 3 / 4 at Oxford; primary purpose to complete RDR Vancouver preparation

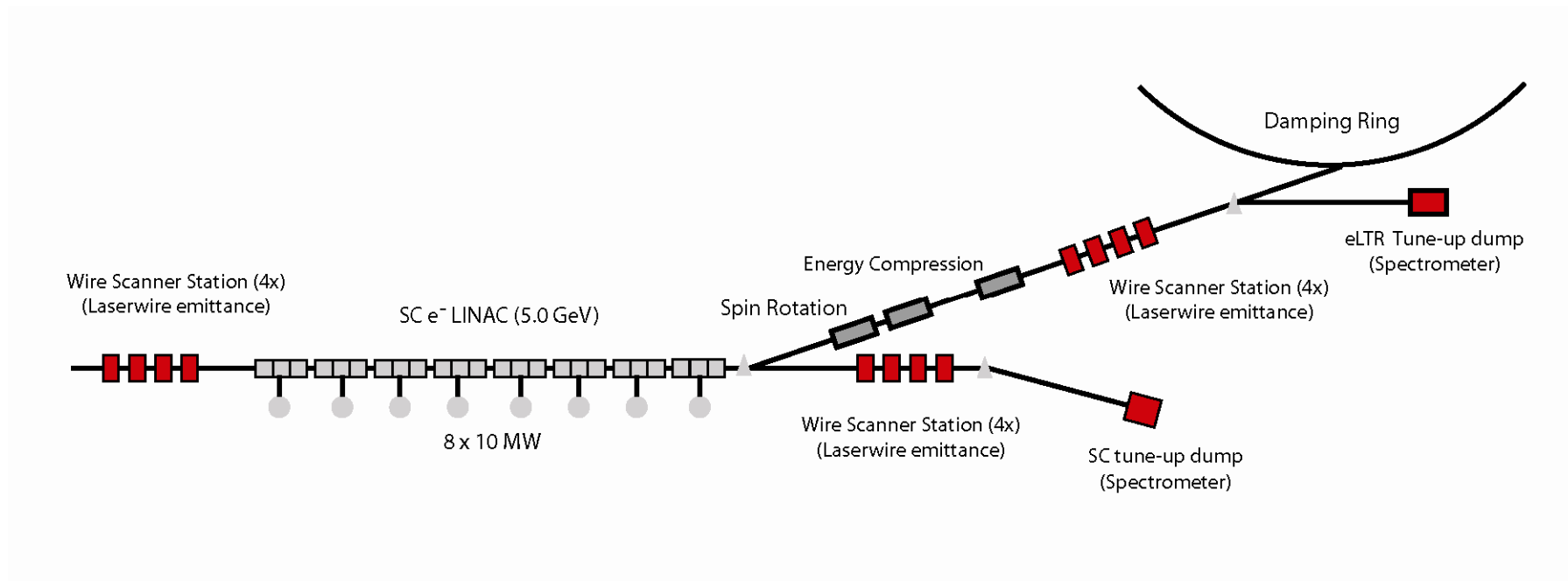
Laser wire block diagram



				17887
Laser		350000	17	5950
laser power		50000	17	850
laser controls		10000	17	170
laser cables		2000	17	34
laser room		30000	17	510
transport (500 ft seg)		100000	25	2500
transport controls		10000	25	250
transport cables		5000	25	125
IP		100000	70	7000
IP controller		2000	70	140
IP cables		2000	70	140
Detector		5000	29	145
detector controls		2000	29	58
detector cables		500	29	15

# e- injector

- similar number in e<sup>+</sup> system

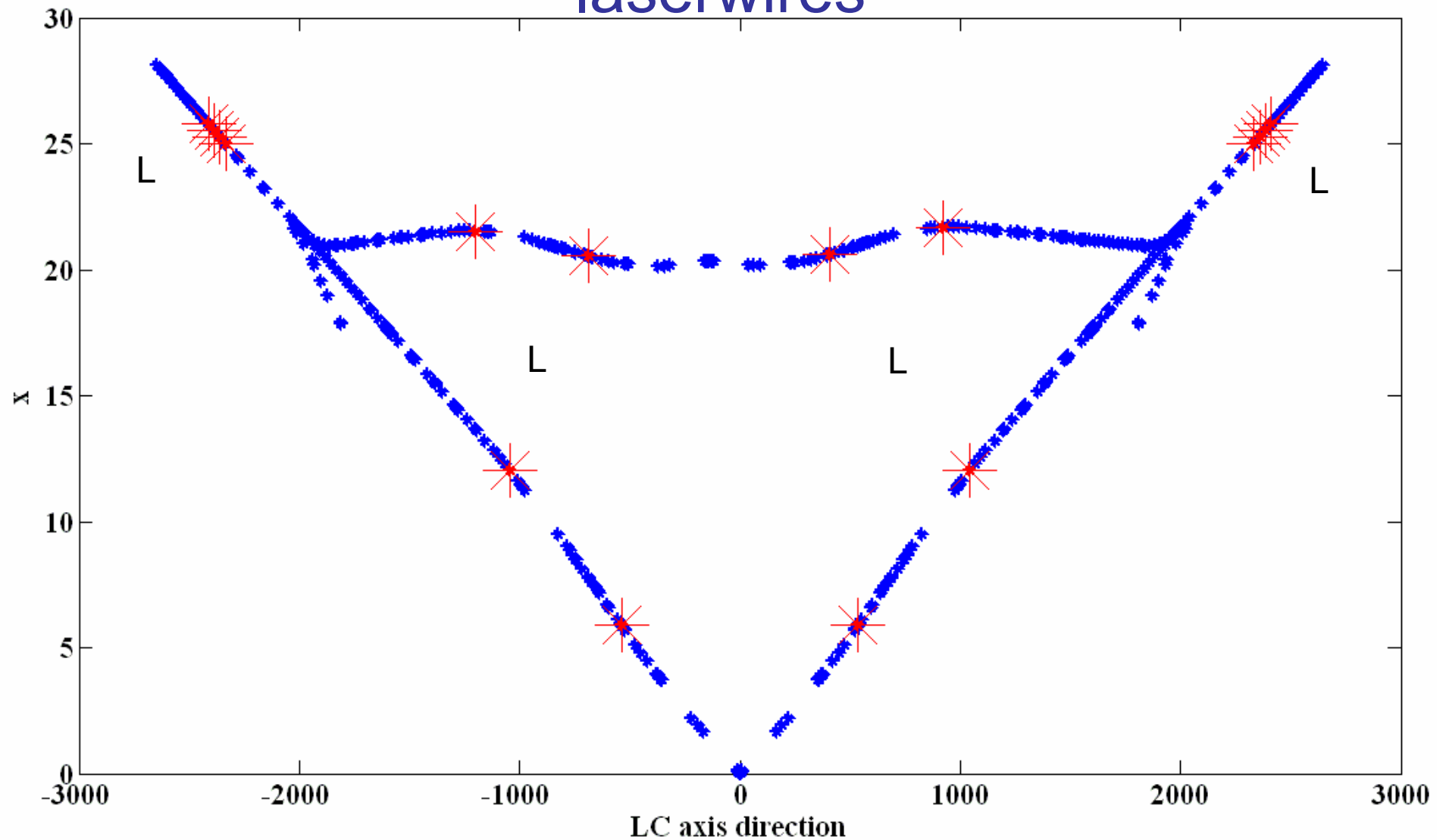


# Linac laserwires

- there is a long break in each linac for the ‘undulator’ and the positron extension
  - 5 each IPs (maybe both before and after the undulator)
- in addition there are 3 warm sections between the cryo segments (2.5 5 and 7 km)
  - one IP in each warm section



# Beam Delivery System BPM's and laserwires



# Laserwire issues

- Specifications and understanding of usage
  - beam sizes
  - measurement accuracy and precision
  - coupling measurements
- CFS interface
  - laser enclosure specification
  - laser beam transport
  - laser safety
- design margin
  - small beams and extreme aspect ratios (1000:1 in RTML) need study
- Detector and optics integration
- Window protection
  - long, optics-free transport systems with sealed window connection

## For the ILC RDR instrumentation:

- 20 minute plenary presentation afternoon day 1
- Need:
  - nominal beam sizes at each laser wire
  - specs for each system (power, wavelength, pulse rate)
    - (e+/e-, DR, RTML (one or two?), linac, BDS
    - 5 or 6 different types.
  - major parts count
  - descriptions
  - rough costs & labor – non-recurring and installation
  - block diagram



# Technical Systems group leaders responsibilities include:

- Design, cost analysis and scheduling of ILC technical systems
- Optimization and standardization of system designs across the machine
- Develop Definitions, Descriptions, Specifications
- Establishing the WBS structure for their sub-systems
- Establishing a WBS dictionary which describes each WBS task, see [WBS Dictionary](#)
- Choose model for basis of estimate
- Perform scaling, parametric or bottoms up estimates
- Follow *standard checklist* to estimate activities, materials, labor, equipment for task.
- Quote cost estimate to 50% confidence level (50% chance cost will be above, 50% chance cost will be below quoted estimate).
- Perform technical reliability and risk analysis
- Produce top level cost summaries in Excel (or SLAC WBS Tool) format
- Evaluate factors for cost risk analysis
- Transfer this cost information to Design Cost Board (DCB)

## June 12 controls/instrumentation RDR

1. Special feedback systems (intra-train) may have fallen through the cracks between Controls and Instrumentation. We need to create a list of systems and agree who will cost them [Action: Controls and Instrumentation Groups]
7. There appears to be overlaps in costing scope between the control system, LLRF, instrumentation, and HLRF. This needs to be clarified.

[Action: Controls, Instrumentation, HLRF Groups]

Imagers - prof / SR/XSR				
	prof	SR	XSR	total
e <sup>-</sup>	6			7
e <sup>+</sup>	10		2	12
DR		3	3	6
RTML	6		4	10
Linac				0
BDS	2		4	6
	24	3	14	41

Prof → OTR

SR → optical SR

XSR → (imaged)  
converted x-ray SR

wire scanners		
	scanners	Detectors
e <sup>-</sup>	12	3
e <sup>+</sup>	12	3
DR	3	3
RTML	2	2

Where does the information come from:

e<sup>-</sup> Axel

e<sup>+</sup> John and Vinod

DR 1 per ring

RTML RDR wiki

Linac

BDS ~ informal