



Survey of the slow control project for the PANDA cluster-jet target

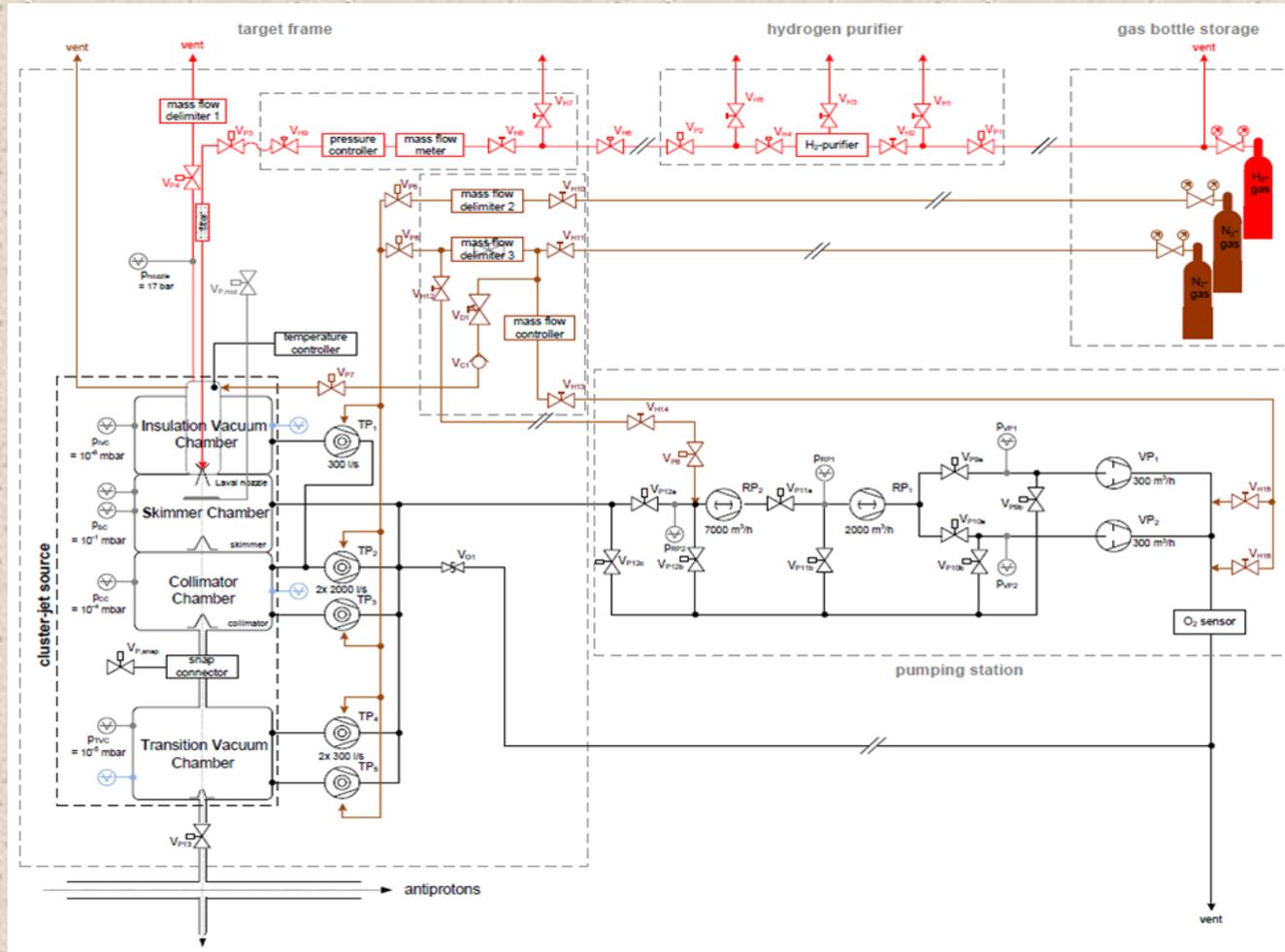
Target Session of LII PANDA Meeting



Agenda

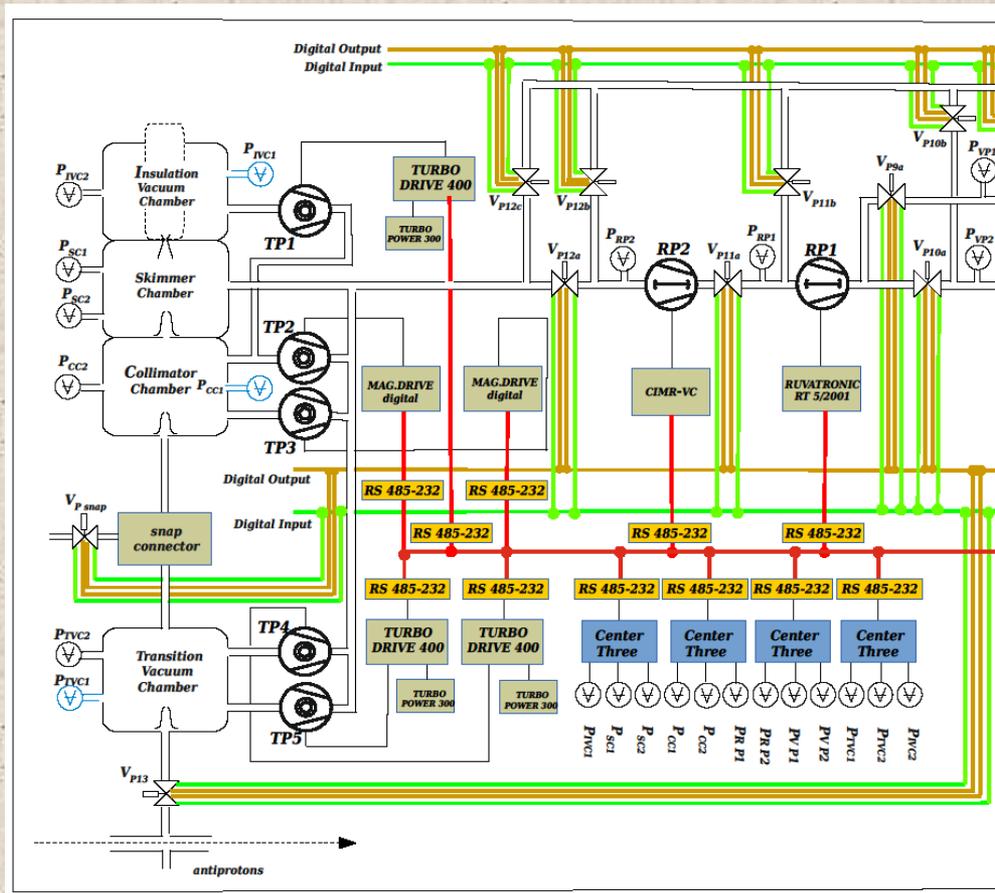
- 1. Subsystems of the cluster-jet target**
 - 1.1. Cluster-jet source**
 - 1.1.1. Cluster-jet source vacuum system**
 - 1.1.2. Laval nozzle temperature control**
 - 1.1.3. Hydrogen pressure control and gas-flow measurement via the Laval nozzle**
 - 1.1.4. Nitrogen distribution system to purge hydrogen from the cluster-jet vacuum system (not discussed at the moment)**
 - 1.1.5. Supply system of ultra-pure hydrogen via heated Pd-filter (in charge of SMI Vienna)**
 - 1.2. Cluster-jet beam-dump**
 - 1.2.1. Cluster-jet beam-dump vacuum system**
 - 1.2.2. Nitrogen distribution manifold to purge hydrogen from the beam-dump (not discussed at the moment)**
- 2. EPICS supervisory in cluster-jet target slow control**
- 3. Foreseen devices for the cluster-jet target slow control and their estimated cost**
- 4. Manpower and slow control time schedule**

Subsystems of cluster-jet target



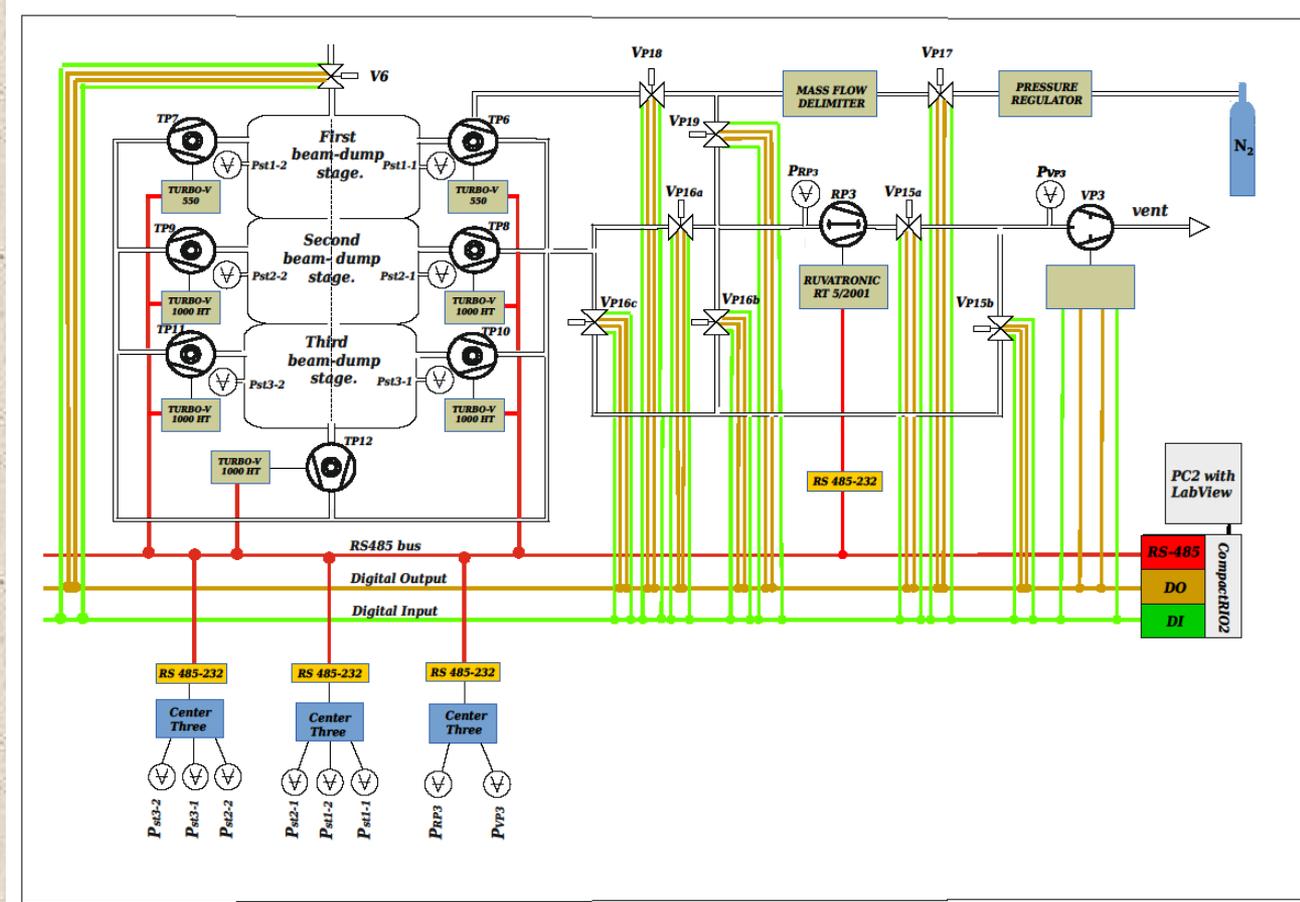


Hardware serving the control of cluster-jet source vacuum system



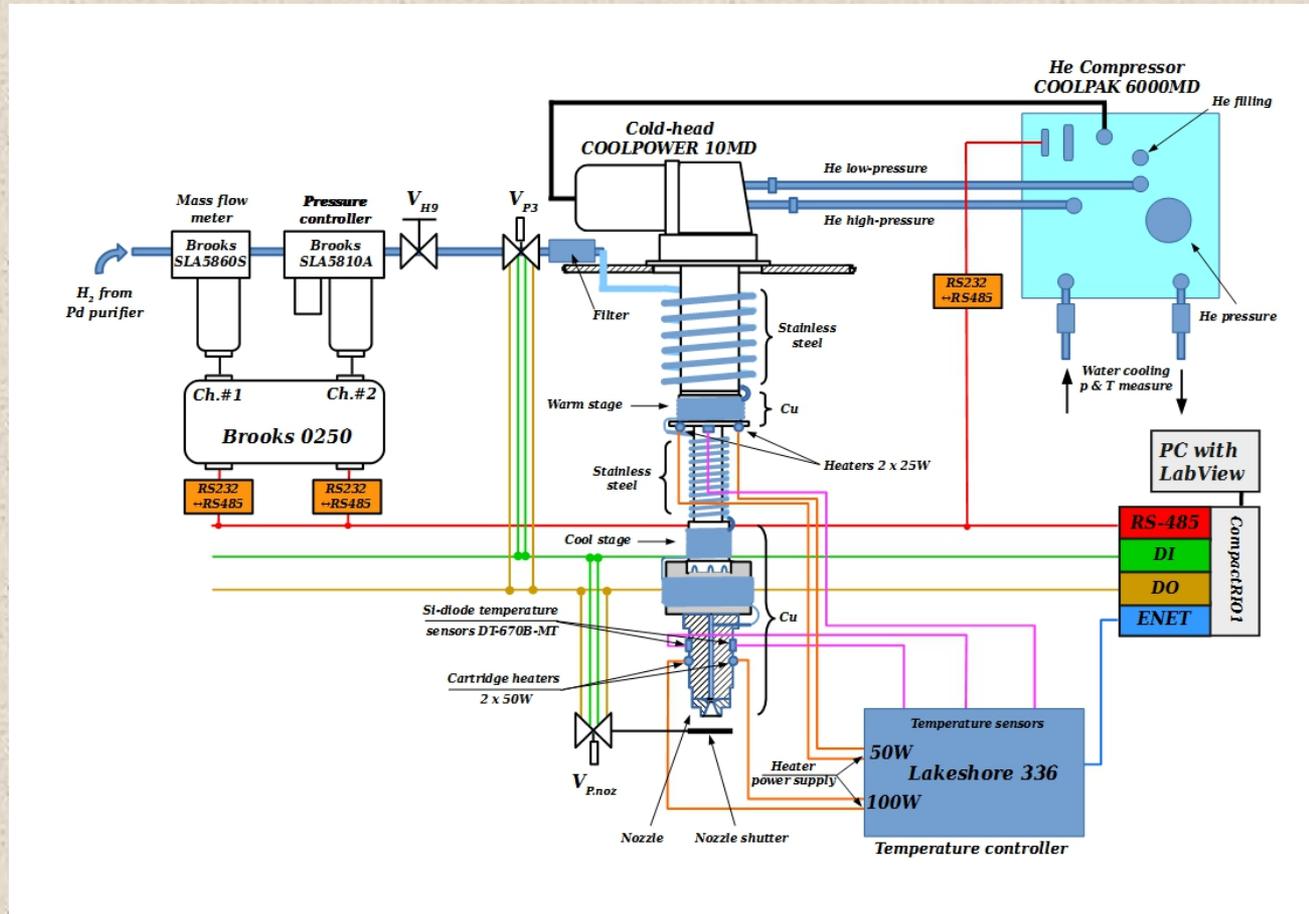


Hardware serving the control of cluster-jet beam-dump vacuum system



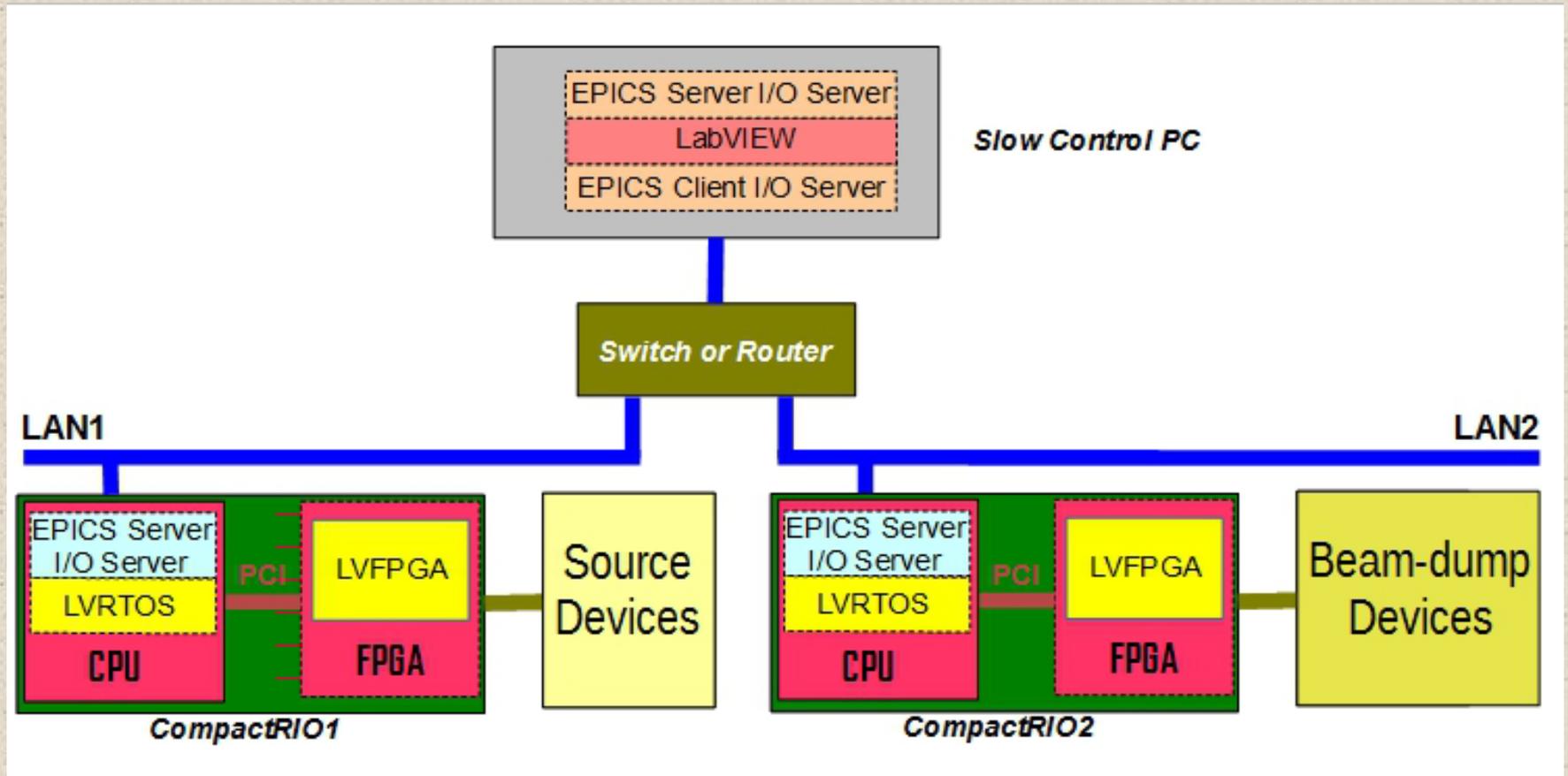


Hardware serving Laval nozzle temperature and pressure control and gas-flow measurement



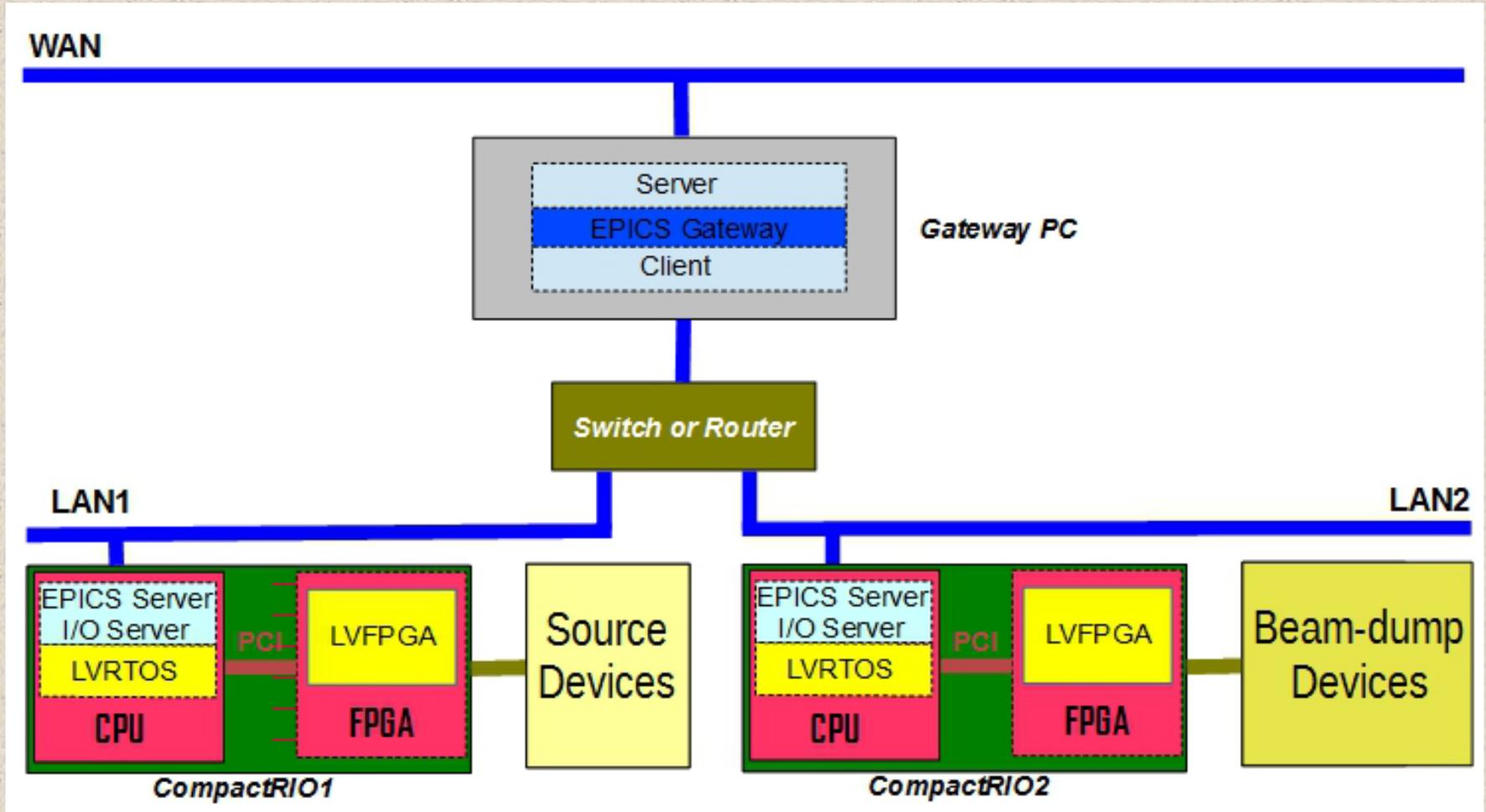


Data exchange between layers – making running phase





Data exchange between layers – final setup





New CompactRIO Chassis Integrated with Controller

Model Type	NI cRIO-9074	NI cRIO-9081	NI cRIO-9082
Processor and memory	400 MHz industrial real-time processor	1.06 GHz dual-core Intel Celeron processor, 16 GB nonvolatile storage, 2 GB DDR3 800 MHz RAM	1.33 GHz dual-core Intel Core i7 processor, 32 GB nonvolatile storage, 2 GB DDR3 800 MHz RAM
Operating System	Vx Works	LabVIEW Real-Time for determinism or Windows Embedded Standard 7 for flexibility	LabVIEW Real-Time for determinism or Windows Embedded Standard 7 for flexibility
Chassis	8-slot Spartan-3 (2M gate) FPGA chassis	8-slot Spartan-6 LX75 FPGA chassis	8-slot Spartan-6 LX150 FPGA chassis
Peripherals	Two 10/100BASE-T Ethernet ports; RS232 serial port for connection to peripherals	1 MXI-Express, 4 USB Hi-Speed, 2 Gigabit Ethernet, and 2 serial ports for connectivity, expansion	1 MXI-Express, 4 USB Hi-Speed, 2 Gigabit Ethernet, and 2 serial ports for connectivity, expansion
Price (with power supply + mounting accessories)	~2900 euro	~6600 euro	~7500 euro

Pictures of CompactRIO Chassis



NI cRIO-9074

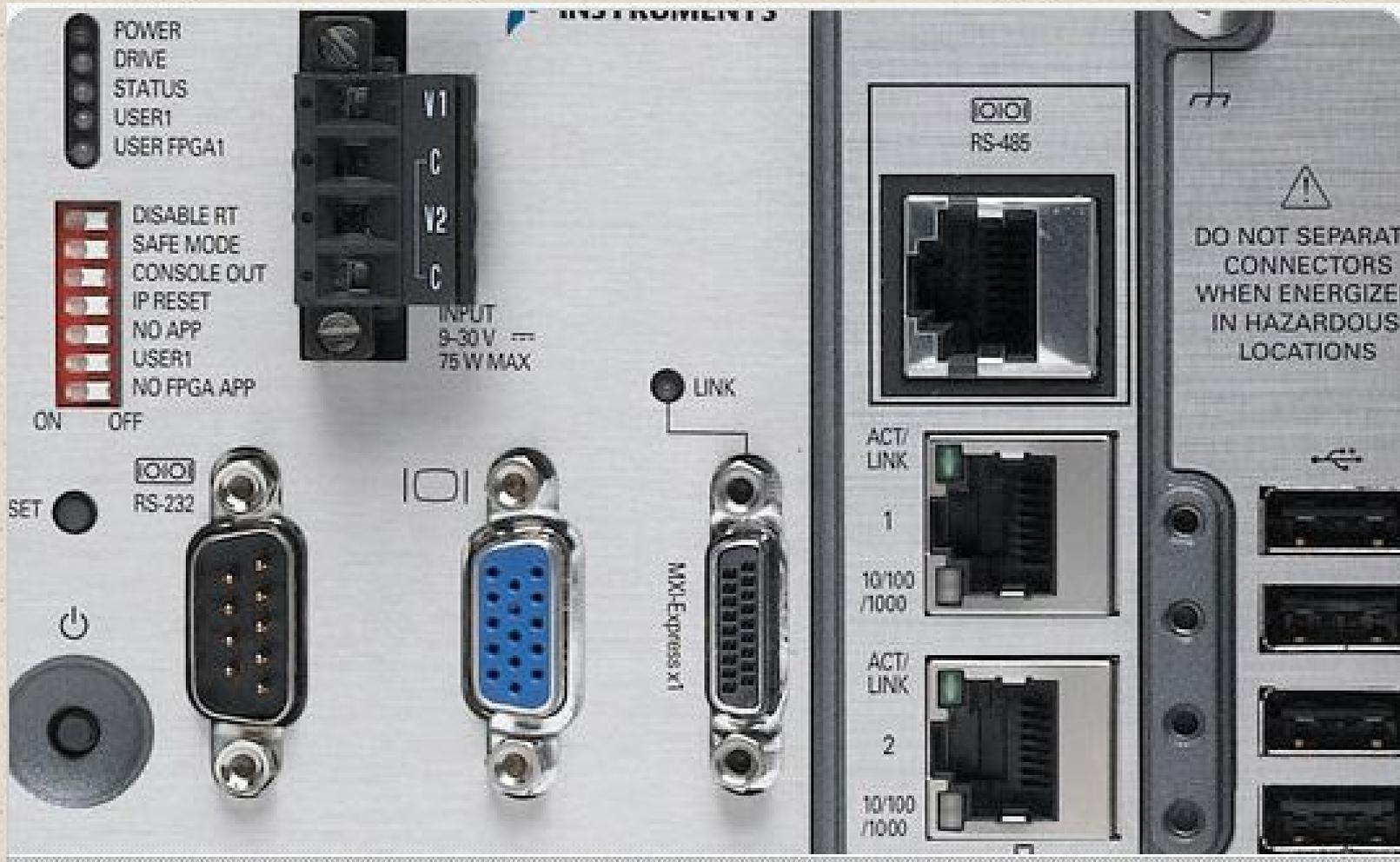


NI cRIO-9081



NI cRIO-9082

NI cRIO-9081 and NI cRIO-9082 Peripherals





Estimated hardware costs

Device Type	Source	Beam-dump	Unit price [PLN]	Total [PLN]
NI cRIO-9082 w/ power supply , panel mount kit and 10m cables	1 pcs	1 pcs	33 358,00 + 23% VAT	82 060,68
NI 9477 (Digital Output)	2 pcs	2 pcs	2 195,00 + 23% VAT	10 799,40
NI 9425 (Digital Input)	2 pcs	2 pcs	1 775,00 + 23% VAT	8 634,60
NI ENET- RS485/4 w/ rack mount kit	1 pcs		5 413,00 + 23% VAT	13 315,98
NI PS-16 (Power Supply)	2 pcs	2 pcs	1 254,00 + 23% VAT	6 169,68
PC Computer or laptop	1 pcs	1 pcs	~ 8 000,00 + 23% VAT	29 520,00
RS232-RS485 Converter	12 pcs	5 pcs	800,00 + 23% VAT	16 728,00



Estimated hardware costs continued

- ▶ In total: 136 545,00 + 23% VAT => 167 950,35 PLN => ~40 000,00 euro
- ▶ There will be also necessary 2 LabVIEW licenses for 43 260,00 PLN + 23% VAT each, what in total is 106 419,60 PLN => ~25 338,00 euro
- ▶ There are not included cables, extra mechanical parts, so the prices are subject to change



Manpower and slow control tasks time schedule

- ▶ **Actually there are 4 people part time working for cluster-jet target slow control**
- ▶ **After signing the contract we plan to employ 2 more collaborators**
- ▶ **The time schedule for cluster-jet target slow control tasks is still in preparation and will be presented in the nearest future**
- ▶ **Critical dates:**
 - **when the Muenster cluster-jet target will become available for experimenting with slow control**
 - **when the in-kind contract will be signed and funds start flowing**