



# HLRF Meeting



September 14, 2006

# Agenda

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- RF Distribution
  - Description of options studies – Nantista
- WC Racks - All
  - Updated Profiles, Count
  - Power dissipation
  - Operating temperatures, cooling
- Charging Supply
  - Existing FNAL design is Baseline
  - Power system problems & solutions – Cassel
- Other

| Sub-unit rack                         |   |         |         |              |                |                     |        |           |               |                      |             |  |
|---------------------------------------|---|---------|---------|--------------|----------------|---------------------|--------|-----------|---------------|----------------------|-------------|--|
| Module                                | Sub-module  | V(Load) | I(Load) | Power (Load) | Power (Module) | fraction to air (%) | VA     | Comment   | Required (VA) | Power ends up in air | Cooling     |  |
| Modulator control rack (S.Fukuda)     |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | PLC<br>Communication<br>Fiber Link<br>NIM or CAMAC BIN<br>BNC Box<br>Relay Sequence Box |         |         |              | 2000VA         | 100                 |        |           | 2000          | 2000                 | Air Cooling |  |
| Klystron Support Rack 1 (S.Fukuda)    |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | Ion Pump Power Supply   | 5kV     | 5mA Max |              | 100VA          | 100                 | 100VA  | Thales    |               | 100                  |             |  |
|                                       | Digital Meter Relay   |         |         |              | 100VA          | 100                 | 100VA  |           |               | 100                  |             |  |
|                                       | Wave Monitor  |         |         |              | 150VA          | 150                 | 150VA  |           |               | 150                  |             |  |
|                                       | NIM or CAMAC BIN  |         |         |              | 150VA          | 150                 | 150VA  |           | 4500          | 150                  | Air Cooling |  |
|                                       | Heater Power Supply   | 9.5V    | 43.5A   | 413VA        | 180VA          | 30                  | 600VA  | Thales    |               | 180                  |             |  |
|                                       | DC Core Reset Power   | 300V    | 5A Max  | 1500VA       | 500VA          | 25                  | 2000VA | KEK PT    |               | 500                  |             |  |
| Klystron Support Rack2 (S.Fukuda)     |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | Magnet P/S Controller   |         |         |              | 300VA          | 100                 | 300VA  |           |               | 300                  |             |  |
|                                       | Magnet power Supply   | 50V     | 70A     | 3500VA       | 500VA          | 12.5                | 4000VA | Thales    | 7000          | 500                  | Air Cooling |  |
|                                       | RF fault detectors/arc detectors interlocks connecting to modulator                     |         |         |              | 200VA          | 100                 | 200VA  |           |               | 200                  |             |  |
|                                       |   |         |         |              | 200VA          | 200                 | 200VA  |           |               | 200                  |             |  |
| LLRF (S. Michizono)                   |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | ATCA  |         |         |              | 500VA          | 100                 | 500VA  |           |               | 500                  |             |  |
|                                       | Piezo Driver  |         |         |              |                | 0                   | 0      |           |               |                      |             |  |
|                                       | RF Amplifier  |         |         | 500VA        | 300VA          | 37.5                | 800VA  |           | 3000          | 300                  | Air Cooling |  |
|                                       | Power Supply for ATAC   |         |         |              | 750VA          | 100                 | 750VA  |           |               | 750                  |             |  |
| Motor Controller (H. Hayano/02272006) |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | pulse motor controller for ATT/Stub-tuner   |         |         | 1470VA       | 630VA          | 30                  | 2100VA |           | 4000          | 630                  | Air Cooling |  |
|                                       | timing reference line/controller/distributor  |         |         | 350VA        | 150VA          | 30                  | 500VA  |           |               | 150                  |             |  |
|                                       | High Power Attenuator Motor   |         |         | 700VA        | 300VA          | 30                  | 1000VA |           |               | 300                  |             |  |
| Cavity (H. Hayano/02272006)           |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | pulse motor controller for input coupler/tuner  |         |         | 895VA        | 405VA          | 30                  | 1350VA | 24ch+24ch | 3000          | 405                  | Air Cooling |  |
|                                       | Piezo tuner controller  |         |         | 1120VA       | 480VA          | 30                  | 1600VA | 48ch      |               | 480                  |             |  |
|                                       | HOM monitor cables  |         |         |              |                |                     |        | 0 48ch    |               |                      |             |  |
| cryogenics (H. Hayano/02272006)       |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | Vacuum cryogenics monitors (temp, pressure, liquid level)                               |         |         | 700VA        | 300VA          | 30                  | 1000VA | 24cg+24ch |               | 300                  |             |  |
|                                       | Pump PS/controller  |         |         | 530VA        | 270VA          | 30                  | 900VA  | 9ch       | 1500          | 270                  | Air Cooling |  |
|                                       | gauges  |         |         |              | 200VA          | 100                 | 200VA  | 9ch       |               | 200                  |             |  |
| BPM (H. Hayano/02272006)              |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | control BPM signal process electronics with CPU/LAN                                     |         |         |              | 1000VA         | 100                 | 1000VA | 3ch       |               | 1000                 |             |  |
|                                       | interface-bus unit with CPU/LAN   |         |         |              | 500VA          | 100                 | 500VA  |           |               | 500                  |             |  |
|                                       | acc. Safty & MPS interface unit with optical link                                       |         |         |              | 500VA          | 100                 | 500VA  |           | 5000          | 500                  | Air Cooling |  |
| Magnet (H. Hayano/02272006)           |   |         |         |              |                |                     |        |           |               |                      |             |  |
|                                       | Q-mag PS  |         |         | 800VA        | 200VA          | 20                  | 1000VA | 6U        |               | 200                  |             |  |
|                                       | corrector PS  |         |         | 1600VA       | 400VA          | 20                  | 2000VA | 6U+6U=12  |               | 400                  |             |  |
|                                       |   |         |         |              |                |                     |        |           | 30000         | 11265                |             |  |

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ILC HIRF RACK PROFILE ID/TITLE:  
Klystron Support Rack 2  
By Shigeki Fukuda, Date 2006/09/31

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| 28 | Digital Motor Relay(4ch) | 28 |
| 27 | KEKosaka-483Wx85Hx100D   | 27 |
| 26 | Wave Monitor Scope       | 26 |
| 25 | Teletronics KNS900+      | 25 |
| 24 | Teletonics TDS014B       | 24 |
| 23 | 482Wx177Hx400D           | 23 |
| 22 | NDS-FIN                  | 22 |
| 21 | 2nd Speed Drive Base     | 21 |
| 20 | 482Wx220Hx300D           | 20 |
| 19 |                          | 19 |
| 18 |                          | 18 |
| 17 | Ion Pump PS(2ch)         | 17 |
| 16 | Toshiba VT-6988S         | 16 |
| 15 | 482Wx177Hx290D           | 15 |
| 14 |                          | 14 |
| 13 | Heater PS Controller     | 13 |
| 12 | 30.3H                    | 12 |
| 11 | Heater PS                | 11 |
| 10 | Stabilized AC PS 1LVA    | 10 |
| 9  | Takaragi(Japan)          | 9  |
| 8  | Model TAC-102            | 8  |
| 7  | 430Wx200Hx400D           | 7  |
| 6  |                          | 6  |
| 5  | DC Cus+Reset PS          | 5  |
| 4  | 200Vx5A Inverter PS(OK?) | 4  |
| 3  | Takamago(Japan) Model    | 3  |
| 2  | 483Wx199Hx690D           | 2  |
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ILC HIRF RACK PROFILE ID/TITLE:  
Klystron Support Rack 1  
By Shigeki Fukuda, Date 2006/09/31

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ILC HIRF RACK PROFILE  
KLYSTRON AUXILIARY POWER SUPPLIES  
By C. Jensen FNAL, Date 09/07/06

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ILC HIRF RACK PROFILE  
MK AUXILIARY INTERLOCK RACK  
By C. Jensen FNAL, Date 09/07/06

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ILC HIRF RACK PROFILE ID/TITLE:  
Cavity  
By H. Hayano, Date Sep. 11, 2006

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ILC HIRF RACK PROFILE ID/TITLE:  
Waveguide\_PMIreference\_rf  
By H. Hayano, Date Sep. 11, 2006

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ILC HIRF RACK PROFILE ID/TITLE:  
Cryogenics\_Vacuum\_monitoring  
By H. Hayano, Date Sep. 11, 2006

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ILC HIRF RACK PROFILE ID/TITLE:  
BPM/Local\_CPUmagnet\_PS  
By H. Hayano, Date Sep. 11, 2006

# Cooling Issues

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- Single WC racks
- All racks on chiller
- Only LLRF, sensitive equipment on chiller
- Others on LCW at 90-95F

# Knurr Specs

| cooling capacity | Width | Height | Depth       | Useable height | Useable depth | Weight | Water content | Electrical data     |
|------------------|-------|--------|-------------|----------------|---------------|--------|---------------|---------------------|
| <b>10kW</b>      | 700mm | 1800mm | 1200/1300mm | 29 HU          | 740/840mm     | 290kg  | 5.9kg         | 200 – 264V<br>1000W |
|                  | 700mm | 2000mm |             | 33 HU          |               |        |               |                     |
|                  | 700mm | 2200mm |             | 38 HU          |               |        |               |                     |
| <b>15kW</b>      | 800mm | 1800mm | 1200/1300mm | 31 HU          | 740/840mm     | 310kg  | 7.9kg         | 200 – 264V<br>1400W |
|                  | 800mm | 2000mm |             | 35 HU          |               |        |               |                     |
|                  | 800mm | 2200mm |             | 40 HU          |               |        |               |                     |
|                  | 800mm | 2400mm |             | 44 HU          |               |        |               |                     |
| <b>22kW</b>      | 800mm | 2200mm | 1200/1300mm | 37 HU          | 740/840mm     | 340kg  | 9.9kg         | 200 – 264V<br>1800W |
|                  | 800mm | 2400mm |             | 42 HU          |               |        |               |                     |
| <b>35kW*</b>     | 800mm | 2200mm | 1200/1300mm | 37 HU          | 740/840mm     | 340kg  | 9.9kg         | 200 – 264V<br>1800W |
|                  | 800mm | 2400mm |             | 42 HU          |               |        |               |                     |

  

|                                     |                            |   |  |
|-------------------------------------|----------------------------|---|--|
| Spread chilled water:               | 12/18°C *12/22°C           | Pressure loss (heat exchanger):         | 0.5bar   |
| Air temperature to server:          | 22°C *25°C                 | max. operation pressure heat exchanger: | 10bar  |
| Air temperature return from server: | 35°C *50°C                 | max. absolute humidity on site:         | 8g/kg  |
| Connection heat exchanger:          | 1" female thread           | Standard colours:                       | RAL 7021 (black grey)<br>RAL 7035 (light grey) |
| Connection condensate tray:         | 5/8" water hose connection |   |  |

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Ray,

Here are some dimensions, per your request.  
by the way, the **40KW** total is now larger than the 12.8KW rack load that we you gave before.

OptionA: Dedicated Chilled Water Skid with chiller plant in the surface

Ecobay gave a dimension using a 100KW stulz water skid of **41" W x 33" D x 77" H**. In the current assumption, this feeds 4 RF (but all depends on the load, which looks like is still changing)

OptionB: Dedicated Chiller in the tunnel just for the racks (& rejecting condenser heat to LCW)

Liebert gave a dimension for a 36KW chiller of **77" W x 39" D x 39"H** (its actually an aircooled that can be converted to watercooled)  
Liebert also gave me a dimension of a real off-the shelf watercooled **74"W x 33"D x 72"H** for another 36KW chiller and 41KW chiller

OptionC: Chiller attached to racks & rejecting condenser hear to LCW) (This was the option you rejected, but i thought i gave the dimension anyway)

Liebert gave a dimension of **~10" X 48" X 82"H**. One of this is attached to cool 3 to 6 racks (depending on heat load).

Emil

# Other Business

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- ART Level 2 WBS effort - started
- RDR Writing Plan – not started