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SPL parameter table

link to the Linac4 ParameterTable

General linac parameters

Parameters for the different modes of operation

List of cavities, cryo-modules, length of linac including extraction areas, quadrupole gradients [↗](#)

Cavity parameters

Cryo Parameters

General linac parameters

| Parameter | Unit | HP-SPL | LP-SPL | Timestamp |
|-------------------------------------|-------|---|----------|------------------|
| Energy | [GeV] | 5 | 4 | 15 August 2007 |
| Beam power | [MW] | >4.0 | 0.144 | 31 March 2008 |
| Repetition rate | [Hz] | 50 | 2 | 15 August 2007 |
| Average pulse current | [mA] | 20/40 | 0-20 | 28 November 2008 |
| Peak pulse current | [mA] | 32/64 | 32 | 15 August 2007 |
| Source current | [mA] | 40/80 | 40 | 21 April 2008 |
| Chopping ratio | [%] | 62 | 62 | 21 November 2008 |
| Beam pulse length | [ms] | 0.4 ⁽¹⁾ - 0.8 ⁽²⁾ | 0.9 | 2010-04-13 |
| Number of klystrons (704 MHz, 5 MW) | | tbd | tbd | 15 August 2007 |
| Geometric cavity beta | | 0.65/1.0 | 0.65/1.0 | 24 April 2009 |
| Number of cavities | | 60/184 | 60/144 | 2009-10-06 |
| Additional cavities for debunching | | 0/16 | 0/16 | 2009-10-06 |
| Cavities/klystron | | tbd | tbd | 22 April 2008 |
| Cavities/cryostat | | 3/8 | 3/8 | 2010-05-04 |
| Max. power/cavity | [MW] | 1 | 0.5 | 21 April 2008 |
| Length ⁽³⁾ | [m] | 525 | 450 | 2009-11-09 |

⁽¹⁾ high-current operation

⁽²⁾ low-current operation

⁽³⁾ excluding Linac4, including 16 debuncher cavities at linac end, including extraction to ISOLDE and EURISOL

Parameters for the different modes of operation

| Parameter | Unit | HP-SPL | HP-SPL | LP-SPL | Timestamp |
|-----------------------|-------|-------------|--------------|--------|------------|
| | | low-current | high-current | | |
| Energy | [GeV] | 5 | 5 | 4 | 2010-04-13 |
| Beam power | [MW] | 4.0 | 4 | 0.144 | 2010-04-13 |
| Repetition rate | [Hz] | 50 | 50 | 2 | 2010-04-13 |
| Average pulse current | [mA] | 20 | 40 | 0-20 | 2010-04-13 |
| Peak pulse current | [mA] | 32 | 64 | 32 | 2010-04-13 |
| Source current | [mA] | 40 | 80 | 40 | 2010-04-13 |

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|--|---------------|-----------|-----------|-----------|------------|
| Chopping ratio | [%] | 62 | 62 | 62 | 2010-04-13 |
| Beam pulse length | [ms] | 0.8 | 0.4 | 0.9 | 2010-04-13 |
| filling time constant τ_f (b=0.65/1.0) | [ms] | 0.54/0.55 | 0.27/0.27 | 0.54/0.55 | 2010-04-13 |
| actual cavity filling time: $\ln(4) \times \tau_f$ | [ms] | 0.75/0.76 | 0.37/0.38 | 0.75/0.76 | 2010-04-13 |
| RF pulse length (filling time + flat top) | [ms] | 1.55/1.56 | 0.77/0.78 | 1.65/1.66 | 2010-04-13 |
| Protons per pulse | [10^{14}] | 1.0 | 1.0 | 1.13 | 2010-04-13 |
| Beam duty cycle | [%] | 4 | 2 | 0.18 | 2010-04-13 |
| RF duty cycle | [%] | 7.8 | 3.9 | 0.33 | 2010-04-13 |
| Cryogenics duty cycle | [%] | 8.2 | 4.1 | 0.35 | 2010-04-13 |

Cryo design parameters (assuming 40 mA/0.4 ms beam pulse as nominal, 20 mA/0.8 ms beam pulse as ultimate)

| Parameter | Unit | low-beta | high-beta | Timestamp |
|---|--------|------------------|------------------|------------|
| * | * | nominal/ultimate | nominal/ultimate | * |
| Cavity bath temperature | [K] | 2.0 | 2.0 | 2010-05-11 |
| Beam loss | [W/m] | 1.0 | 1.0 | 2010-05-11 |
| Static loss along cryo-modules at 2 K | [W/m] | ? | ? | 2010-05-11 |
| Static loss at 5-280 K | [W/m] | ? | ? | 2010-05-11 |
| Accelerating gradient | [MV/m] | 19.3 | 25 | 2010-05-11 |
| Quality factor | 10^9 | 6/3 | 10/5 | 2010-05-11 |
| R/Q value (linac def.) | [Ohm] | 275 | 566 | 2011-11-17 |
| Cryogenic duty cycle | [%] | 4.09/8.17 | 4.11/8.22 | 2010-05-11 |
| Coupler loss at 2.0 K | [W] | <0.2/0.2 | <0.2/0.2 | 2010-05-11 |
| HOM loss at 2.0 K in cavity | [W] | <1/<3 | <1/<3 | 2010-05-11 |
| HOM coupler loss at 2.0 K (per coupler) | [W] | <0.2 /0.2 | <0.2/0.2 | 2010-05-11 |
| HOM & Coupler loss 5-280 K | [g/s] | 0.05 | 0.05 | 2010-05-11 |
| Tunnel slope | [%] | 1.7% | 1.7% | 2010-05-11 |
| Magnet operating temperature | [K] | ambient | ambient | 2010-05-11 |
| No of cavities | | 60 | 200 | 2010-05-11 |
| No of cryostats | | 20 | 25 | 2010-05-11 |
| Cavities per cryostat | | 3 | 8 | 2010-05-11 |
| Dynamic heat load p. cavity | [W] | 4.2/16.8 | 5.1/20.4 | 2010-05-25 |

-- FrankGerigk - 15 Aug 2007

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