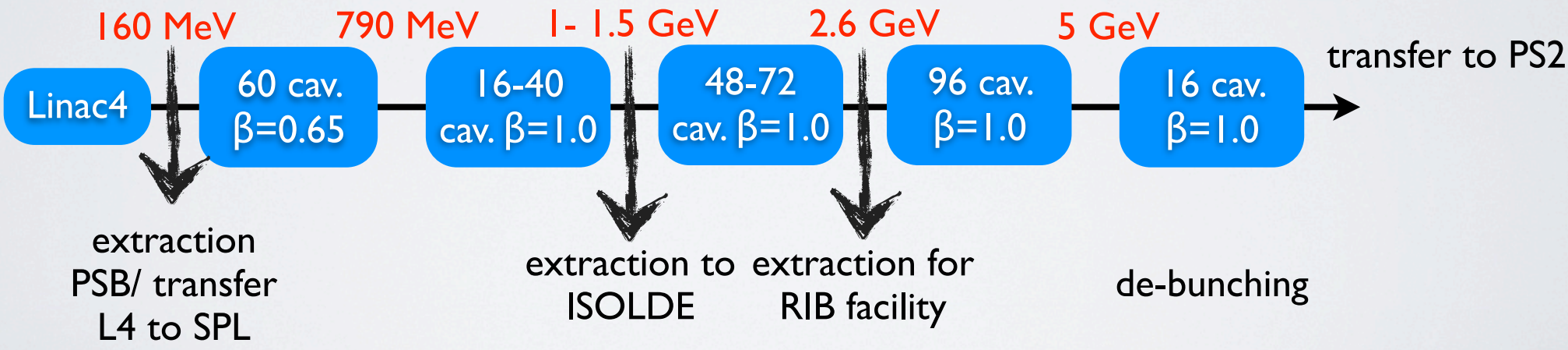
SUMMARY ON MACHINE ARCHITECTURE



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MILESTONE 1: SEPARATE CRYO-MODULES

comes out of the cryo-segmentation workshop and became "stronger" during the collaboration meeting:

- **Disclaimer:** Definite decision will be taken once all the information is digested. If confirmed, it implies:
  - quick exchange of single modules (promise of faster commissioning),
  - slightly higher initial investment but much reduced risk in case of a vacuum leak,
  - possibility of warm quads: i) easier alignment of quads, ii) simpler cryo-module design, iii) more flexible operation, iv) avoids safety issues with cold quads, v) higher power consumption,
  - no margin to have more cavities in order reach 5 GeV in case of lower than expected cavity performance, but since it easier to take modules out for reprocessing we will be less punished by under-performing cavities.
  - use of FFDD lattice becomes mandatory.

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MILESTONE 11: KLYSTRONS ON THE SURFACE

- **Disclaimer:** Definite decision will be taken once all the information is digested. If confirmed, it implies:
  - potential cost saving and simplification of civil engineering (safety aspects, space restrictions, installation..),
  - simplifies the transition from a low-power SPL to a high-power SPL (we don't have to justify a huge tunnel for the low-power SPL...), solves problem of having "compact" HP-SPL modulators,
  - first CERN estimates indicate LLRF feasibility, similar installations are at work at FNAL (with working LLRF feedback),
  - need to address cooling of wave-guides for high-power operation,
  - need to find suitable wave-guide geometry (space vs low loss & group delay),

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MILESTONE III: RF SPLITTING

- **Disclaimer:** ....
  - **LP-SPL:** most likely for we split from one klystron (1.5 MW) to 2 cavities in the high-beta part, and use one source (type of source to be defined) per cavity in the low-beta part,
  - **HP-SPL**: use the same klystron and go to 1 klystron per cavity in high-beta part, upgrade low-beta part,
  - work needed on wave-guide type/routing, etc.

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PROPOSAL FOR DESIGN/ MINIMUM REQUIREMENTS

minimum requirement	
max. output energy	**4 GeV**
max. gradient (β=0.65/β=1)	**15.4/20 MV/m**
RF frequency	704 MHz
Q_0 (β=0.65/β=1)	**??**5.8/8.4 x 10^9**??**
(R/Q) (β=0.65/β=1)	320/525
beam current	20 mA
repetition rate	50 Hz
beam pulse length	**0.9 ms**
beam duty cycle	**4.5%**

design values	
max. output energy	**5 GeV**
max. gradient (β=0.65/β=1)	**19.3/25 MV/m**
RF frequency	704 MHz
Q_0 (β=0.65/β=1)	**??**5.8/8.4 x 10^9**??**
(R/Q) (β=0.65/β=1)	320/525
beam current	20/40 mA
repetition rate	50 Hz
beam pulse length	**≤1.2 ms**
beam duty cycle	**6%**

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LASER STRIPPING AT PS2/ ACCUMULATOR INJECTION

- laser stripping seems very attractive but requires a small energy spread in the beam (and ideally short pulse lengths),
- a small spread can be produced at the expense of larger phase width (and vice versa)... but larger phase width needs longer laser pulses (assuming the laser is synchronised with the bunches)..
- in case of failing cavities, or changing cavity performance we may easily walk out of the accepted energy window,
  - requested energy acceptance of 100 keV is unrealistc,
  - are we willing to choose "conservative" gradients in order to make laser stripping work? **unlikely!!**

put this topic on hold?

EXTRACTIONS TO ISOLDE/EURISOL

- extraction to ISOLDE seems feasible within one lattice period without much effort,
- extraction to EURISOL (2.5 GeV, multi-MW) will probably require one period plus a few metres, or more inventive cold-warm transitions of the cryo-modules,
- if EURISOL is located "after" the SPL, beam could be transported with reduced cavity gradients (and probably higher currents) to the end of the linac (advantage if we have NC quadrupoles!)

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FURTHER POINTS

- iterations of warm magnet design with beam dynamics: i) stripping of H- (optimise magnet length), ii) explore lattice options, which can reduce the number of needed magnets,
- estimate static cryo-load for separated modules,
- study the use of quadrupolar pick ups inside of quads for beam matching, potential to eliminate any wire scanners,
- study optimum cryo-temperature, for 1.2 ms beam pulses, 50 Hz, cryogenics puts a strain on cryogenics,

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