



Comments on Project X coupler requirements

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Project X beam requirements (linac)

- 1.6e14 protons per pulse
- Rate: 2.5 Hz to 15 Hz (future)
- Bunch structure:
 - 325MHz bunches
- Chopper patterns:
 - Fast pattern: 53 MHz
 - Slow pattern (for a kicker gap): 90 kHz to 1 MHz, duty cycle as low as 25%
- Cavity peak gradient: 50 MV/m
 - Equiv to a 25-MeV gain for a $\beta=1$ particle on crest
- Protons are accelerated at about -15° off-crest



Coupler considerations

- 1.6e14 protons can be delivered with:
 - a 20-mA, 1.25-ms beam pulse, 1.5-ms Klystron pulse (baseline at present)
 - => Requires coupler R&D
 - a 10-mA, 2.5-ms beam pulse, 3-ms Klystron pulse (alternative)
 - => Requires Klystron R&D
- Coupler will supply ~500 kW peak or 3.7 kW average (@ 5 Hz) power
 - During cavity fill 100% reflection: coupler will “see” equiv. of 2 MW peak.
- We would like for the coupler:
 - to have variable (adjustable) Q_{ext}
 - to be bias-able



Coupler considerations (cont'd)

- Proposed processing parameters
 - 600 kW at 1.5 ms and (~20% overhead)
 - 2.2 MW at 0.2ms (~10% overhead)
- Average power at 15 Hz requires special R&D