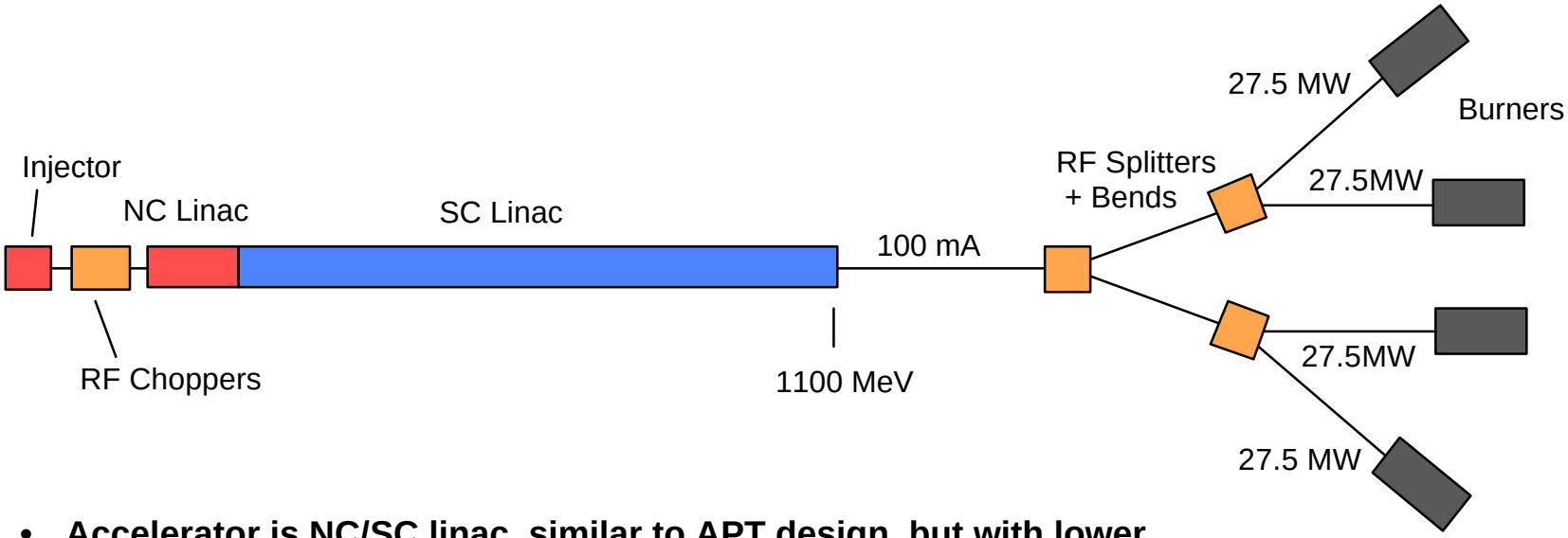
Reference ATW Accelerator-Target Configuration



- **Accelerator is NC/SC linac, similar to APT design, but with lower transition energy.**
- **Accelerating gradient in SC cavities would be higher than in APT, with up to 500 kW per rf drive. Shorter length.**
- **Beam power is distributed equally to four production burners by RF splitters operating at 1/2 the bunch frequency, followed by magnetic bending systems.**
- **Beam could be eliminated from one or more burners, to allow for refueling, by RF choppers at input to linac.**

Accelerator Technology TWG Activities and Plans

- **March 15-17 meeting; identified key technology drivers**
- **ATW Plant accelerator/target architecture developed in concert with SSI TWG**
  - beam parameters close to APT (100 mA CW, 1100 MeV)
  - APT linac design is starting point
  - ATW system has additional requirements
- **AT TWG Report**
  - draft outline developed and circulated
  - initial writing assignments made
  - some material assembled
- **Accelerator "micro"- reliability identified as major issue**
  - more challenging requirement than for APT linac
  - operational time constants discussed with T/B experts
- **Next meeting: May 4-5 in Los Alamos**

Additional Requirements for ATW Plant

- **Beam distribution to multiple targets**
  - reference plant concept has 4 burners
  - provide same beam current to each burner; power adjustability not required
  - use burnable poisons or insertable rods for reactivity control
  - use rf splitters (SC cavities with transverse rf fields) plus septum (separation) magnets
- **Independent control of beams delivered to individual targets**
  - needs rf chopping system at LE end of linac
  - may require funneling or beam-combining using H^+/H^- beams
- **Micro-reliability; minimizing beam interrupts**
  - major issue is tolerance of subcritical assembly
  - few-sec interrupts are tolerable but produce thermal shock
  - few-min interrupts require beam ramp-up over similar times, and cause degradation of heat transport equipment
  - beam interrupts longer than 10 min will require > 1 hour restart

How to Deal with Micro-Reliability Issue

- **Accelerator Reliability Workshop in France, November 1999**
- **Accelerator architecture should emphasize**
  - low-stress operating/parameter regime
  - redundancy of key equipment systems
  - rapid switching from failed equipment to backups
- **ED&D program should focus on**
  - understanding equipment failure mechanisms (rf discharges, etc)
  - development of ultra-reliable and long-life hardware

ED&D Program for Accelerator

- Higher-gradient superconducting cavities & cryomodules
- Lower-beta superconducting cavities & cryomodules
- Superconducting focusing elements (quadrupoles)
- Superconducting rf beam splitters
- Front end micropulse beam selector system
- More efficient, more reliable rf generators
- Low-failure rf components (windows, power couplers, etc.)