

## Fermilab Booster Parameters (December 5, 2002)

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|   |                                |
|---|--------------------------------|
| Circumference (m)   | 474.2                          |
| Average machine radius (m)                                  | 75.47                          |
| Injection kinetic energy (MeV)                              | 400                            |
| Extraction kinetic energy (GeV)                             | 8                              |
| Repetition rate (Hz)  | 15                             |
| RF frequency (MHz)  | 37.87 – 52.81                  |
| Harmonic number   | 84                             |
| Protons per bunch   | $6 \times 10^{10}$             |
| Protons per cycle   | $5 \times 10^{12}$             |
| Protons per second*   | $2.5 \times 10^{13}$           |
| Protons per hour*   | $9 \times 10^{16}$             |
| Average beam current* ( $\mu\text{A}$ )                     | 4                              |
| Average beam power* (kW)                                    | 32                             |
|   |                                |
| Lattice   | FOFODODO                       |
| Super-periodicity   | 24                             |
| Cell length (m)   | 19.758                         |
| Length of combined function magnet (m)                      | 2.889612                       |
| Magnet per cell   | 4                              |
| Magnet total  | 96                             |
| Number of straight sections                                 | 24 Long, 24 Short, 48 Mini     |
| Length of each straight section (m)                         | 6(Long), 1.2(Short), .5 (Mini) |
| Max/Min $\beta_x$ (m)                                       | 33.67 (Short)/6.12 (Long)      |
| Max/Min $\beta_y$ (m)                                       | 20.46 (Long)/5.27 (Short)      |
| Max/Min $D_x$ (m)   | 3.19 (Long)/1.84 (Short)       |
| Phase advance per cell $\phi_x, \phi_y$ (degree)            | 100.5, 102                     |
| Horizontal, vertical tune $\nu_x, \nu_y$                    | 6.7, 6.8                       |
| Natural chromaticity $\xi_x, \xi_y$                         | -9.2, -7.0                     |
| Transition $\gamma_t$                                       | 5.45                           |
| Transition momentum (GeV/c)                                 | 5.03                           |
| Transition crossing moment (ms)                             | 17                             |
| $\beta$ at injection, extraction                            | 0.713, 0.994                   |
| $\gamma$ at injection, extraction                           | 1.426, 9.526                   |
| $ \eta $ at injection, extraction                           | 0.458, 0.0227                  |
| Revolution frequency at injection, extraction (kHz)         | 450.8, 628.7                   |
| Revolution time at injection, extraction ( $\mu\text{s}$ )  | 2.22, 1.59                     |
| Injection turns (typical)                                   | 11                             |
| Injection time (typical, $\mu\text{s}$ )                    | 24.4                           |
| Injection linac peak current (typical, mA)                  | 40                             |
| Maximum Laslett tune shift                                  | 0.4                            |
| Normalized transverse emittance $\epsilon_N$ (95%, mm-mrad) | $12 \pi$                       |
| Longitudinal emittance (95%, eV-s)                          | 0.1                            |

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\* MiniBooNE continuous operation at 5 Hz.