

In the following, a general format for the input file of MITHRA is presented. The red icons or groups can be repeated in the text. *int* stands for an integer number, *real* represents a real value, and *string* denotes a string of characters. The reference directory in the path locations is the path where the simulation is started. In other words, “./” points to the location where the project is called.

```

MESH
{
  length-scale
    = < real |
      METER |
      DECIMETER |
      CENTIMETER |
      MILLIMETER |
      MICROMETER |
      NANOMETER |
      ANGSTROM >

  time-scale
    = < real |
      SECOND |
      MILLISECOND |
      MICROSECOND |
      NANOSECOND |
      PICOSECOND |
      FEMTOSECOND |
      ATTOSECOND >

  mesh-lengths
    = < ( real, real, real ) >
  mesh-resolution
    = < ( real, real, real ) >
  mesh-center
    = < ( real, real, real ) >
  total-time
    = < real >
  total-distance
    = < real >
  bunch-time-step
    = < real >
  mesh-truncation-order
    = < 1 | 2 >
  space-charge
    = < true | false >
  solver
    = < NSFD | FD >
  optimize-bunch-position
    = < true | false >
  initial-time-back-shift
    = < real >
}

BUNCH
{
  bunch-initialization
  {
    type
      = < manual |
        ellipsoid |
        3D-crystal |
        file >

    distribution
      = < uniform | gaussian >
    file-name
      = < string >
    charge
      = < real >
    number-of-particles
      = < int >
    gamma
      = < real >
    beta
      = < real >
    direction
      = < ( real, real, real ) >
    position
      = < ( real, real, real ) >
    sigma-position
      = < ( real, real, real ) >
    sigma-momentum
      = < ( real, real, real ) >
    numbers
      = < ( int, int, int ) >
    lattice-constants
      = < ( real, real, real ) >
    transverse-truncation
      = < real >
  }
}

```

```

    longitudinal-truncation
      = < real >
    bunching-factor
      = < real between 0 and 1 >
    bunching-factor-phase
      = < real >
    shot-noise
      = < true | false >
  }

  bunch-sampling
  {
    sample
      = < true | false >
    directory
      = < /path/to/location >
    base-name
      = < string >
    rhythm
      = < real >
  }

  bunch-visualization
  {
    sample
      = < true | false >
    directory
      = < /path/to/location >
    base-name
      = < string >
    rhythm
      = < real >
  }

  bunch-profile
  {
    sample
      = < true | false >
    directory
      = < /path/to/location >
    base-name
      = < string >
    time
      = < real >
    rhythm
      = < real >
  }
}

FIELD
{
  field-initialization
  {
    type
      = < plane-wave |
        confined-plane-wave |
        gaussian-beam >

    position
      = < ( real, real, real ) >
    direction
      = < ( real, real, real ) >
    polarization
      = < ( real, real, real ) >
    radius-parallel
      = < real >
    radius-perpendicular
      = < real >
    signal-type
      = < neumann | gaussian |
        secant-hyperbolic |
        flat-top >

    strength-parameter
      = < real >
    offset
      = < real >
    pulse-length
      = < real >
    wavelength
      = < real >
    CEP
      = < real >
  }

  field-sampling
  {
    sample
      = < true | false >
    type
      = < over-line | at-point >
    field
      = < Ex | Ey | Ez |

```

```

        Bx | By | Bz |
        Ax | Ay | Az |
        Jx | Jy | Jz |
        F | Q >

    directory
      = < /path/to/location >
    base-name
      = < string >
    rhythm
      = < real >
    position
      = < ( real, real, real ) >
    line-begin
      = < ( real, real, real ) >
    line-end
      = < ( real, real, real ) >
    number-of-points
      = < int >
  }

  field-visualization
  {
    sample
      = < true | false >
    type
      = < in-plane | all-domain >
    plane
      = < xy | yz | xz >
    position
      = < ( real, real, real ) >
    field
      = < Ex | Ey | Ez |
        Bx | By | Bz |
        Ax | Ay | Az |
        Jx | Jy | Jz |
        F | Q >

    directory
      = < /path/to/location >
    base-name
      = < string >
    rhythm
      = < real >
  }

  field-profile
  {
    sample
      = < true | false >
    field
      = < Ex | Ey | Ez |
        Bx | By | Bz |
        Ax | Ay | Az |
        Jx | Jy | Jz |
        F | Q >

    directory
      = < /path/to/location >
    base-name
      = < string >
    rhythm
      = < real >
    time
      = < real >
  }
}

UNDULATOR
{
  static-undulator
  {
    undulator-parameter
      = < real >
    period
      = < real >
    length
      = < int >
    polarization-angle
      = < real >
    offset
      = < real >
    distance-to-bunch-head
      = < real >
  }

  static-undulator-array
  {
    undulator-parameter
      = < real >
  }
}

```

[illegible]