* Star System Elements
  + Type
    - Star
      * Luminosity (Size)
        + O, Ia, Ib, II, III, IV, V, VI, VII
      * Spectral Class (Temperature)
        + O, B, A, F, G, K, M, D1, D2
      * Spectral Value
        + 0-9 (hot to cold)
* Types of Radiation
* EMR
  + Ionizing
    - Broken Bonds
      * Gamma Rays
      * X-Rays
      * Ultraviolet
  + Non-Ionizing
    - Optical
      * Visible Light
    - Thermal
      * Infrared
      * Microwave
    - Non-Thermal
      * Radio
      * Extremely Low Frequency

Particle (Ionizing)

* + Cosmic Radiation
    - Proton
  + Neutron
    - Neutron
  + Beta Particles
    - Electron
  + Alpha Particles
    - Proton & Neutron

Gravitational

* + Gravitational Waves

Solar Causes of Radiation

* + Black Hole
    - Gravitational Waves
    - Hawking Radiation (Thermal)
  + Coronal Mass Ejection
    - Proton
    - Electron
    - Neutron
    - Gamma Rays
  + Solar Flare
    - Proton
    - Electron
    - X-Rays
  + Solar Wind (Plasma)
    - Proton
    - Electron
    - Ultraviolet

Nebula

* + Cosmic dust
  + EMR
    - Emission
      * Ionized gas
    - Dark
      * Infrared

Star Lifecycle

* + Protostar
  + Star
  + Red Giant
    - Planetary Nebula (<1.5 mass of sun)
      * White Dwarf
      * Black Dwarf
    - Supernova
      * Neutron Star (1.5 – 3 mass of sun)
      * Black Hole (>3 mass of sun)
* Events
  + Solar Pulse
  + EMR Burst
  + Solar Flare
  + Coronal Mass Ejection
  + Nova (White Dwarf binary)
  + Supernova (large star)

Space Weather

* + Meteoroid Shower
  + Cosmic Dust
  + Micrometeoroid Weathering
  + Solar Wind
  + Electron Storm
  + Proton Storm
  + Neutron Storm
  + Pulsar / Variable Star (EMR scale)
  + Gravitational Waves / Tidal Force
* **Systems**

|  |  |  |
| --- | --- | --- |
| **Type** | **Real %** | **Game (100)** |
| Nexus | ? | 8 |
| Nebula | 0.00001 | 2 |
| Protostar Nebula | 0.00001 | 1 |
| Single | 66 | 55 |
| Binary | 22 | 20 |
| Ternary | 11 | 10 |
| Planetary Nebula | 0.00001 | 1 |
| Neutron Star | 0.1 | 1 |
| Black Hole | 0.1 | 1 |
| Exotic | ? | 1 |

* **Exotic**

|  |  |
| --- | --- |
| **Type** | **Game (8)** |
| Black Dwarf | 1 |
| Quark Star | 1 |
| Hypergiant Star (O luminosity) | 1 |
| Pulsar | 1 |
| X-Ray Binary | 1 |
| Cepheid Variable (size, color) | 1 |
| Variable Star | 1 |
| Wolf-Rayet Star | 1 |

* **Stars**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Spectral Class** | **Luminosity** | **Game (100)** |
| Main Sequence | O, B, A, F, G, K, M | V, VI | 90 |
| Red Giant | K, M | II, III, IV | 1 |
| Red Supergiant | K, M | Ia, Ib | 1 |
| Blue Giant | O, B, A | II, III, IV | 1 |
| Blue Supergiant | O, B, A | Ia, Ib | 1 |
| White Dwarf | B, A, F | VII | 6 |

* **Main Sequence**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Spectral Class** | **Real %** | **Game (100)** |
| Blue | O | 0.00003 | 1 |
| Blue White | B | 0.13 | 3 |
| White | A | 0.6 | 6 |
| Yellow White | F | 3 | 10 |
| Yellow | G | 7.6 | 15 |
| Orange | K | 12.1 | 20 |
| Red | M | 76.45 | 45 |

* **Max Planets**

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Pre-Bio** | **Biozone** | **Post-Bio** |
| Blue Giant |  |  |  |
| Red Giant |  |  |  |
| Main Sequence |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| White Dwarf |  |  |  |

* **Planets**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Class** | **Size** | **Game (100)** |
| Dwarf | DT | 1 | 20 |
| Terrestrial | T | 2 | 16 |
| Super-Terrestrial | ST | 3 | 1 |
| Tiny Gas Giant | G1 | 3 |  |
| Small Gas Giant | G2 | 4 | 4 |
| Gas Giant | G3 | 5 |  |
| Large Gas Giant | G4 | 6 | 4 |
| Huge Gas Giant | G5 | 7 |  |
| Tiny Ice Giant | GI1 | 3 |  |
| Small Ice Giant | GI2 | 4 | 8 |
| Ice Giant | GI3 | 5 |  |

* Planet / Moon
  + Type
    - Dwarf
    - Terrestrial
    - Super-Terrestrial
    - Gas Giant
      * Size: 1-5
    - Ice Giant
      * Size: 1-3
  + Atmosphere
    - Density
    - Composition
  + Body Composition