NEA Project Notes –

The program is used in a scientific sense for many simulations on probalities of partial interactions that cannot be analytically calculated.

The particles themselves

- Hadrons (Superclass)

* Bosons (Class)
  + Proton’s (Subclass)
    - Hold the same quarks
    - Same interactions (May need exchange particle objects)
    - Different spin
    - Speed
    - Position
    - How it moves (How it is drawn)
    - Lifespan
  + Neutron’s (Subclass)
    - Hold the same quarks
    - Same interactions (May need exchange particle objects)
    - Different spin
    - Speed
    - Position
    - How it moves (How it is drawn)
    - Lifespan
* Mesons (Class)
  + Need two quarks (Quark + anti-quark)
  + How they move (Different to most other particles)
  + Lifespan
  + Many different types but all have the same propitiates

- Leptons (Superclass)

* Electrons (Class)
* No quarks needed
* How much energy (Derived from other particles)
* Direction of movement
* Interactions (Pair production)
* Photons (Class)
* No quarks needed
* How much energy
* Directing of movement (Straight line)
* Mediator of the electromagnet force
* Wave-particle Duality?
* Look for others!!

- Quarks (Superclass?)

* 6 flavours
  + Top
  + Bottom
  + Up
  + Down
  + Strange
  + Charm
* They all have a mass and an energy value
* They all have anti-quarks

- Upon collision instances for the required particles are created

* In the next frame of reference particles have moved and other particles will have interacted

- The interactions are mediated by four separate functions that take in the two objects and produce more objects of new particles or the same particles with the same properties.

- Will need to guard against multiple interactions happening at the same time

- Will measure interactions using grid positions and the distance between them

- Add Feynman diagrams

* Some randomness in angle of collision and in turn the beginning direction of ejected particles (Colliding particles could have momentum will be added to the direction of collision upon impact, if particles collide head on then they have no resultant momentum).

What the user will see

1. Set particle type
2. Set speed
3. Review set values
4. Feynman Diagrams
5. Run Simulation

Once run – Time stamp of frame of reference

Particles produced:

1. (Name all the particles produced + their size and speed + Interacting particles)
2. Press enter to run the next frame of reference
3. Review all particles produced in this simulation

Feynman Diagrams

1. A list of all the diagrams + Details of each interacting particles + exchange particles