Abstract

Comparison of New Theory with Special Relativity Theory and Classical Theory
at electron beam deflection.

Simulation with step by step calculation.

A calculation model was generated to determin the deflection of electrons
with a defined kinetic energy according their accelearation through a voltage path (in x-direction)
giving them an energy of e * U. This Energy is universal, it is valid in Classical Physics,
in the Theory of Special Relativity and also in this New Theory.

The consequences are different, as the achieved velocity is in Special Relativity smaller
than in the other theories.

Considered were spherical electrodes where an earth symmetrical Voltage is applied to
bend the electron beam. In order to come to comparable paths, the starting point
for a single electron was chosen to be exactly in the middle of the electrodes (x=0; y=0; Vx=Vx(e*U); Vy=0).
The velocity of a single electron is calculated according the different theories that matches the energy equivalent.
Then time-step by time-step the forces are calculated acting on a single electron,
where the time steps have been dynamically chosen, to allow a 1% maximum difference in velocity from step to step).
Due to the mass the acceleration and then the velocity changes according the time step is determined.
Out of this the new location for the electron is calculated. These steps are then repeated
until a defined for all simulations identical location (about x=1m) is reached.
It has been considered for the SR Theory, that the Gamma factor is only used to
calculate the speed of the electron in x-direction and by that the time needed to go from start to the end.
In order not to conflict with this, the bending E-field (the Voltage between the electrodes)
was so small, so that the elevation was at least 100 times smaller than the path length.
With this the calculation error can be neglected.
(in SR E-fields perpendicular to the velocity vector are not transformed with the Gamma factor).

The whole is somewhat similar to a cathod ray tube using a path of 1m from the deflecting electrodes to the end point, except that there are no plates, insted the capacitor plates are realized with spheres (easier for simulation).

The result of the simulation calculation is as follows:

1. For small energies (<10,000 eV) the x-y path of an electron is nearly identical for all three theories.

2. a) For medium energies the classical theory shows already larger differences to the two other theories, the bending is smaller.

   b) For medium energies the New Theory considering "the magnetic" influence to the flying electron the difference grows compared with SR to a maximum of +12,5% at Gamma = 2 (Gamma calculated according SR). This also has the same value as the so called mass-energy at rest of an electron (m_e*c^2). In this case the New Theory shows a higher bending than calculated with SR.

3. At higher energies the two theories come closer and closer together, so that at larger Gamma factors e.g. >50 the difference in the gradient dy/dx at the end of the path is less than 1% for Gamma >500 the difference is less than 0,1%. The deveation itself (y value at end of path) is < 4% and <0,1% respectively-

The path calculation (x-y diagram) shows practically identical results over the whole energy-range (with a maximum deviation of 12,5% at Gamma=2), though the New Theory has no speed limit for moving particles.
Of course the time from start to the end (about 1m) is different, due to the smaller velocity in SR
with the light speed c as the upper limit.

The simulation was also done for other particles with higher mass and shows identical results for the deviation of the two theories. Also for other particles with other charge to mass ratio the same difference is the outcome.
This outcome of highest deviation at Gamma=2 also stays the same if one changes the deflection voltage.

All these results support the new theory to be generally valid for any charged particle.

Finally one could say and ask:

A) If you take the electrostatic force **and** use Special Relativity (SR) and
calculate the x-y path of a deflected electron beam.

B) If you take the electrostatic force **and** the dynamic (identical to "magnetic") force (without using SR) and calculate the x-y path of a deflected electron beam.

==> The results are basically equal,

identical for low and very high electron energies.

This leads to the Questions:

Why is in the calculation with SR no magnetic influence included ?

Or:

Is SR in this case only an approximation for the missing magnetic influence ?