Re: Einstein's Doppler equation wrong?

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On Tue, 12 Oct 2004 14:59:03 +0100, John Kennaugh wrote:

A comment on the 90 degree case, and on Einstein's use of the word "infinity":

>
> *If it is an infinite distance then the angle between them when it was*
> *emitted is indeterminate surely.*
>
[...]
>
> *The infinite distance is surely to avoid complications with parallax,*
> *light coming from a fixed direction.*

No, not at all. It doesn't avoid those problems at all.

The "infinite distance" isn't really supposed to be infinite, any more than vectors are really "infinitesimal". Einstein was writing in 1905, of course, and a lot of the definitions used in calculus on manifolds hadn't yet been worked out. He uses "infinite" as shorthand for "the limit as the distance becomes large". If he worked explicitly with the limits a lot of things would be much messier.

Assume the emitter is following a path that is, at its closest approach, a distance L from the observer, and 0 < L < infinity. Now draw a line between the observer and the emitter. A photon travels from the emitter to the observer. At the moment when the photon arrives, the line between the observer and emitter makes a right angle with the emitter's path ... phi = 90 degrees.

>From that, one can compute the angle the line between the observer and emitter made with the emitter's path at the moment when the photon was emitted. That must also be the emission angle for the photon, in the observer's frame! Call that angle theta.

Theta doesn't depend on "L". Therefore, the same relationship between the angles will hold in Einstein's case of "infinite distance".

Let's see if I can work it out here... Call the line from the observer to
the emitter's path which makes a right angle with the path the
"perpendicular connector". The emitter's moving at v. The emitter emits
a photon which will arrive at the observer at the instant when the emitter
crosses the perpendicular connector (all this is in the observer's frame).
Then phi = 90 degrees.

Call the time of emission 0.

The distance the emitter travels between emission and reception must be
v*t, where t is the time of reception.

In that time, if C=1, the photon traveled a distance "t".

I assumed