

Re: Misinterpretation of the radial parameter in the Schwarzschild solution?

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2006-08/msg01747.html>

- *From:* stevendaryl3016@xxxxxxxxxx (Daryl McCullough)
 - *Date:* 18 Aug 2006 09:56:39 -0700
-

JanPB says...

I.Vecchi wrote:

The Schwarzschild chart is smooth over the Schwarzschild surface

What do you mean by "Schwarzschild chart" exactly? The one he has in his original paper? It's not smooth at the horizon either...

I think the problem here is that the manifold has not been explicitly defined. I.Vecchi is *identifying* the manifold with the set of 4-tuples $\langle t, r, \theta, \phi \rangle$ with $-\infty < t < +\infty$, $0 < r < +\infty$, $0 \leq \theta \leq \pi$, $0 \leq \phi < 2\pi$. (With the usual smooth structure on subsets of \mathbb{R}^4).

In other words, he's saying that the manifold is just \mathbb{R}^4 , minus the one-dimensional locus corresponding to the singularity at $r=0$.

Kruskal spacetime can be identified with the set of points (T, R, θ, ϕ) with $-\infty < R < +\infty$, $-\sqrt{1+R^2} < T < \sqrt{1+R^2}$, $0 \leq \theta \leq \pi$, $0 \leq \phi < 2\pi$.

That's a different manifold, and there is no smooth map between them.

—

Daryl McCullough
Ithaca, NY

.