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Erratum

Global Existence of Solutions of the Spherically Symmetric Vlasov–Einstein System with Small Initial Data

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In the above paper the authors proved a local existence result for the spherically symmetric Vlasov–Einstein system (Theorem 3.1). Unfortunately, the proof contains an error: To estimate $\dot{f}_n$ in the proof of Lemma 3.3 we had in mind to differentiate the relation (3.4)

$$f_n(t,x,v) = \mathring{f}((X_n, V_n)(0,t,x,v))$$

with respect to t, and use the boundedness of the right-hand side of the characteristic system (3.3) and the "fact" that $(X_n, V_n)(s,t,x,v)$ is symmetric in s,t in the sense that $(X_n, V_n)(0,t,x,v)$ as a function of t solves (3.3) with the signs of the right-hand side reversed. This "fact" is wrong, it would be correct only if (3.3) were autonomous. In the following we indicate the main arguments which have to be added to the analysis in the above paper in order to set things right. A detailed exposition of the arguments can be obtained from the first author.

As a first step we prove Lemma 3.3. By (3.26) and (3.27) we have to bound $\|p_n'(t)\|_\infty$ and $\|\dot{\rho}_n(t)\|_\infty$. Using the Vlasov equation to express $\dot{f}_n$ in

$$\dot{\rho}_n(t,x) = \int \sqrt{1+v^2}\,\dot{f}_n(t,x,v)\,dv\,,$$

integrating the term with $\partial_v f_n$ by parts and using Lemma 3.2 we get

$$\|p_n'(t)\|_\infty, \|\dot{\rho}_n(t)\|_\infty \leqq C_1(t)(1 + \|\partial_x f_n(t)\|_\infty), \quad t \in [0,T[\,,$$

where $C_1(t)$ depends on the functions z_1, z_2 introduced in Lemma 3.2. Differentiating (3.3) with respect to x and using a Gronwall argument yields the estimate

$$|\partial_x X_{n+1}(0,t,z)| + |\partial_x V_{n+1}(0,t,z)| \leqq \exp \int_0^t C_1(s)(1 + \|\partial_x f_n(s)\|_\infty)\,ds\,,$$