Report on the paper:

Limit theorems for a class of critical superprocesses with stable branching.

By Yan-Xia Ren, Renming Song and Zhenyao Sun.

This paper is about critical superprocesses $X = (X_t, t \geq 0)$ with general spatial motion and spatially dependent stable branching mechanism with lowest stable index γ_0. They showed that under some condition the probability of non-extinction at time t is regularly varying with index $(\gamma_0 - 1)^{-1}$. Moreover, they showed that the for a large class of testing function, the mass $X_t(f)$, conditioned on the event of non-extinction at time t, converges weakly after an appropriated rescaling to a random variable. The distribution of this random variable and the re-escaling are given explicitly and they depend only on γ_0.

This paper is well written, they explained all the details and it is easy to follow. The theorems are a nice extension of the discrete state space and continuous state space (without movement) branching processes. I recommend its publication.

Minor details.

1. Page 4 line 4. It has to be They showed that.
2. Page 12 line -10. Equation (2.4) is not only integrating both sides of (2.3), please explain more.
3. Page 20 line 4 In the first equality in the denominator it has to be $y^{1+\gamma(\zeta_s)}$.
4. Page 20 line 10, eq (3.11) You don't need to add x in the norm of $\|k\gamma\phi^{\gamma-1}\|$.
5. Page 20 eq (3.13) and Page 21 in 9 more times. You missed an m in $\langle v, \phi^* \rangle_m$.
6. Page 21 line 1. I will add: On the other hand, according to (3.2) and Proposition 3.2
7. Page 23 line -4. I will add then by Assumption 4, the spine representation, Cambell's formula ...
8. Page 25 equation (3.27) and the next equation. I think that in your equations you missed a factorial, i.e.

$$F_\alpha(\theta) \leq \frac{C^k}{k!}(\rho C + 1)\theta^k$$

   and

$$F_\alpha(\theta) \leq \frac{C^{k+1}}{(k+1)!}(\rho C + 1)\theta^{k+1}$$

   The reason is that in your next computation, Page 25 line -4 and -3. You missed an $\frac{1}{k+1}$ from the integration. In this case, you need to add a $\frac{1}{k}$ to the last equation of page 25.
9. Page 29 in step 3. I will add: Notice that, by (1.20) and since $\langle f, \phi^* \rangle_m = 1$.