Critical mass in a volume filling model

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In my talk I will review our recent common results with Christian Stinner related to the fully parabolic volume filling Keller-Segel model with a probability jump function given by

$$q(u) = (1+u)^{-\gamma}, \quad \gamma \geq 0.$$

The most interesting one is a critical mass phenomenon in dimension 2. It states that for $\gamma \geq 1$ there exists a value of intial mass m_* distinguishing between global-in-time bounded solutions for initial data with mass $m < m_*$ (in the case of radially symmetric solutions the critical value is $8\pi(1+\gamma)$, for any data $m_* = 4\pi(1+\gamma)$) and an existence of solutions which become infinite when time goes to ∞, however existing globally in time. The second situation takes place for initial mass of radially symmetric data exceeding $8\pi(1+\gamma)$. For $0 < \gamma < 1$ we have a similar result, the only difference is that it is open whether in the supercritical case solutions blow up in finite or infinite time.