We demonstrate that despite significant uncertainty in the time evolution of the shock, we can still break the degeneracy of the outgoing and incoming merger scenarios by comparing the observed and the simulated position of the radio relic. The uncertainty of the time evolution of the velocity of the shock stem from how the velocity depends on a number of physical quantities, including the local gravitational potential, matter density, temperature, pressure among others (**?**, Shu .F. more citations???). The exact time evolution of the shock velocity requires detailed numerical simulation similar to Kang et al 1997, Springel & Farrar etc, which is not available for El Gordo at the writing of this paper. Fortunately, we can approximate limit of the shock speed by making use of the simulated speed of the subclusters.

We simplified the calculation by working in the center of mass frame where the shock speed remains approximately constant. We estimated the upper and lower bounds of the time-averaged velocity ($\langle v_{relic} \rangle$) of the shock between the collision of the subclusters and the observed time as:

$$\frac{(v_{3D}(t_{obs}) + v_{3D}(t_{col}))}{2} < \langle v_{relic} \rangle \lesssim v_{3D}(t_{col}) \qquad (1)$$

The lower bound is set to be the average speed of the subcluster since the relic is observed to have traveled further away from the subclusters from the center of mass. The upper bound can be approximated as the relative collision speed of the subclusters due to how the shock is powered by the collision. These assumptions of the range of relic velocity is consistent with the numerical studies of the shock of the Bullet cluster (**?**), right after the collision of the subclusters, the Bullet shock speed was comparable to the merger speed of the two subclusters in the center of mass frame (**?**). The shock speed monotonically drops by only $\sim 14\%$ in the 300 Myr period after the formation of the shock. This is consistent with the fact that shock is a pressure wave and does not experience gravitational deceleration while other dissipative processes could have slowed down the shock wave. It is unlikely that there would be significant energy injected into the shock to speed up the shock .

$$s_{bound} = v_{bound} T\hat{S}C \cos(\hat{\alpha}) \qquad (2)$$

where s_{bound} is the bound projected separation.