

The Observed Huge Amount of Dust at High Redshift Is Explained by the Grain Growth

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Recently, huge amount of dust has been discovered by ALMA:

Lensed galaxy A1689-zD1 (Watson et al. 2015)

**$z = 7.5, M_{\text{dust}} = 4 \times 10^7 M_{\odot}, M_{*} = 1.7 \times 10^9 M_{\odot}, \text{SFR} = 24 M_{\odot}\text{yr}^{-1}$
(Salpeter IMF)**

Lensed galaxy A2744-YD4 (Laporte et al. (2017)

**$z = 8.38, M_{\text{dust}} = 5.5 \times 10^6 M_{\odot}, M_{*} = 1.97 \times 10^9 M_{\odot}, \text{SFR} = 20.4 M_{\odot}\text{yr}^{-1}$
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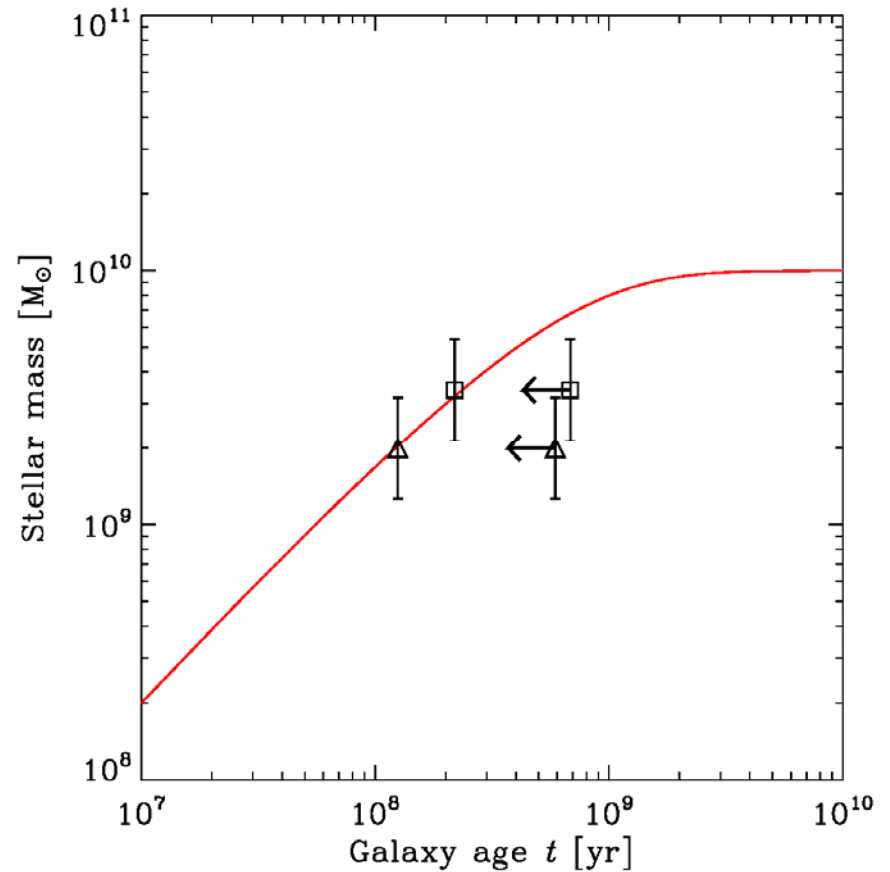
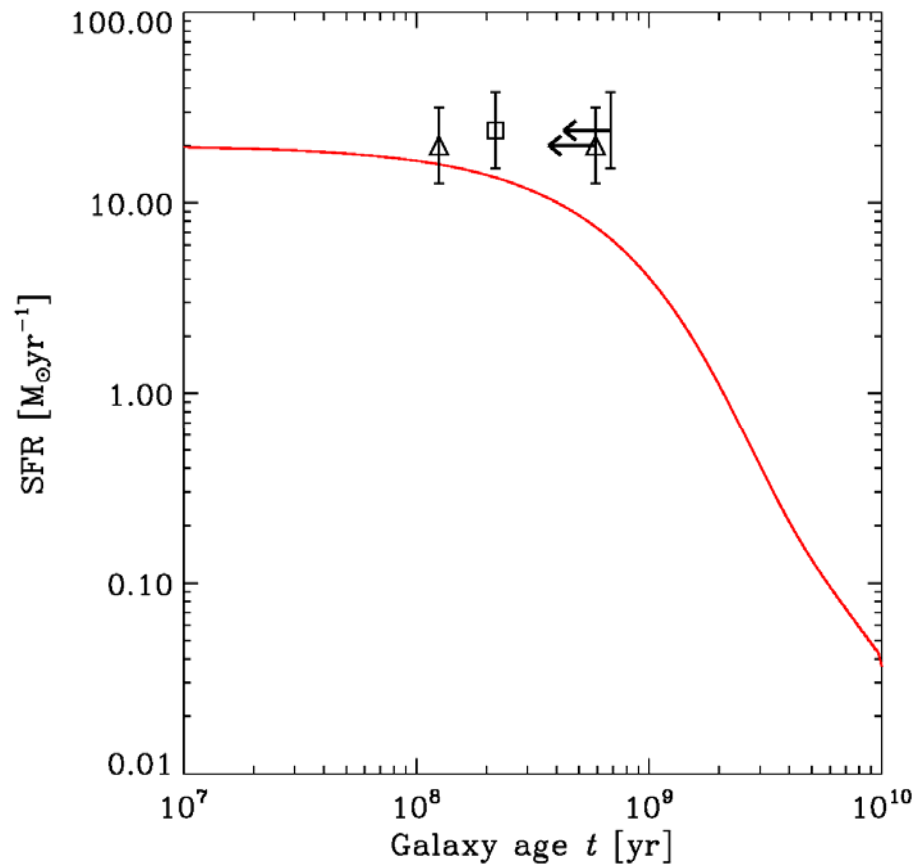
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Is it possible to explain such a huge dust mass consistently?

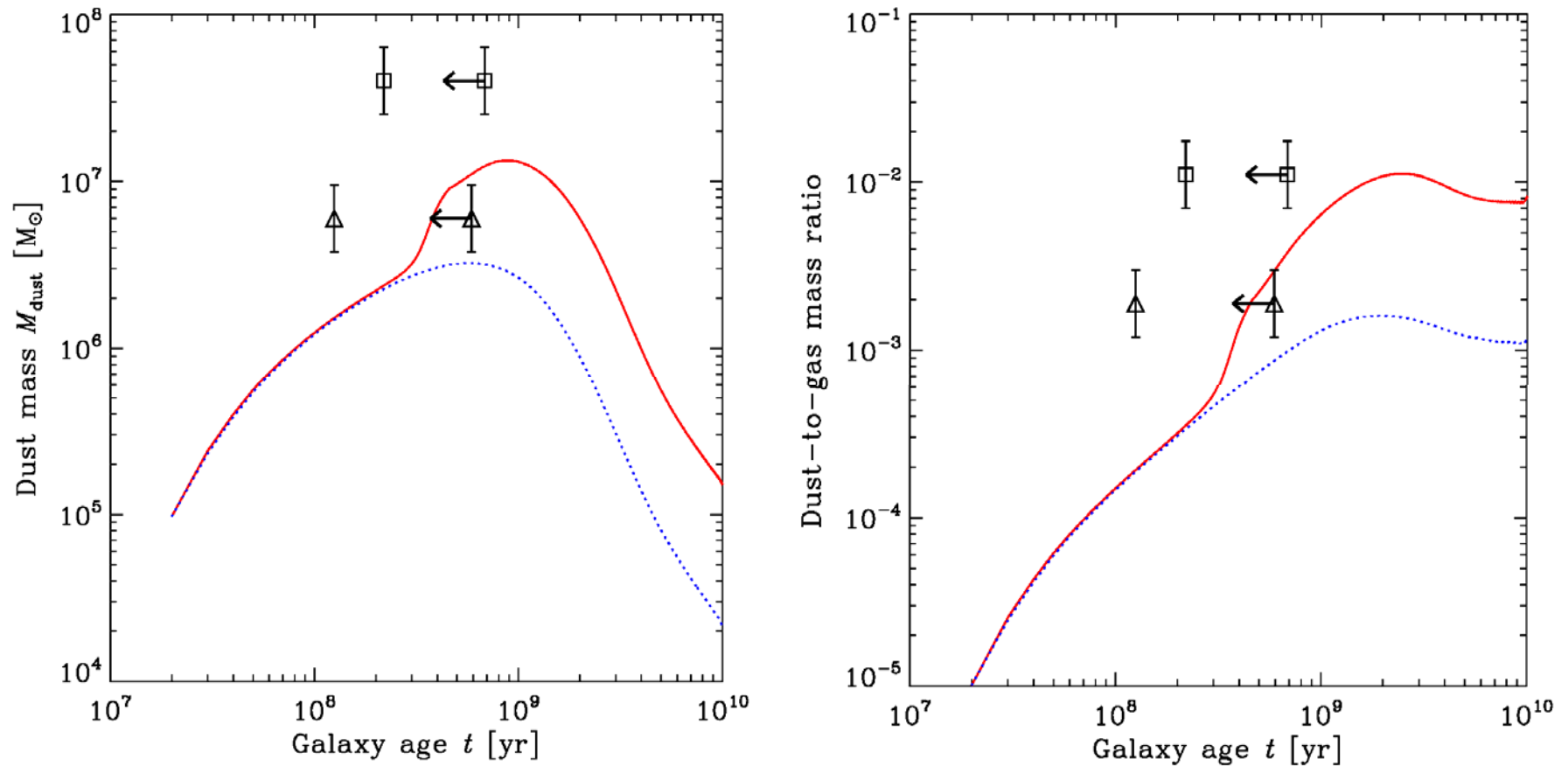
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The answer is YES, by Asano model with grain growth!



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...but necessary to consider more carefully.