

GRAVITATIONAL LENSING

LECTURE 10

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AA 2016-2017

CONTENTS

- time delay surface, multiple images, and distortions

SOME INTERESTING PROPERTIES OF THE TIME DELAY SURFACE

- image multiplicity depends on the relative position of lens and source
- couples of images disappear after approaching each other
- the time-delay function is flat when this happens!
- $\det A=0$ means infinite magnification: the images disappear on the critical lines!
- this happens every time a source crosses a caustic!

EXAMPLE OF TIME DELAY SURFACE

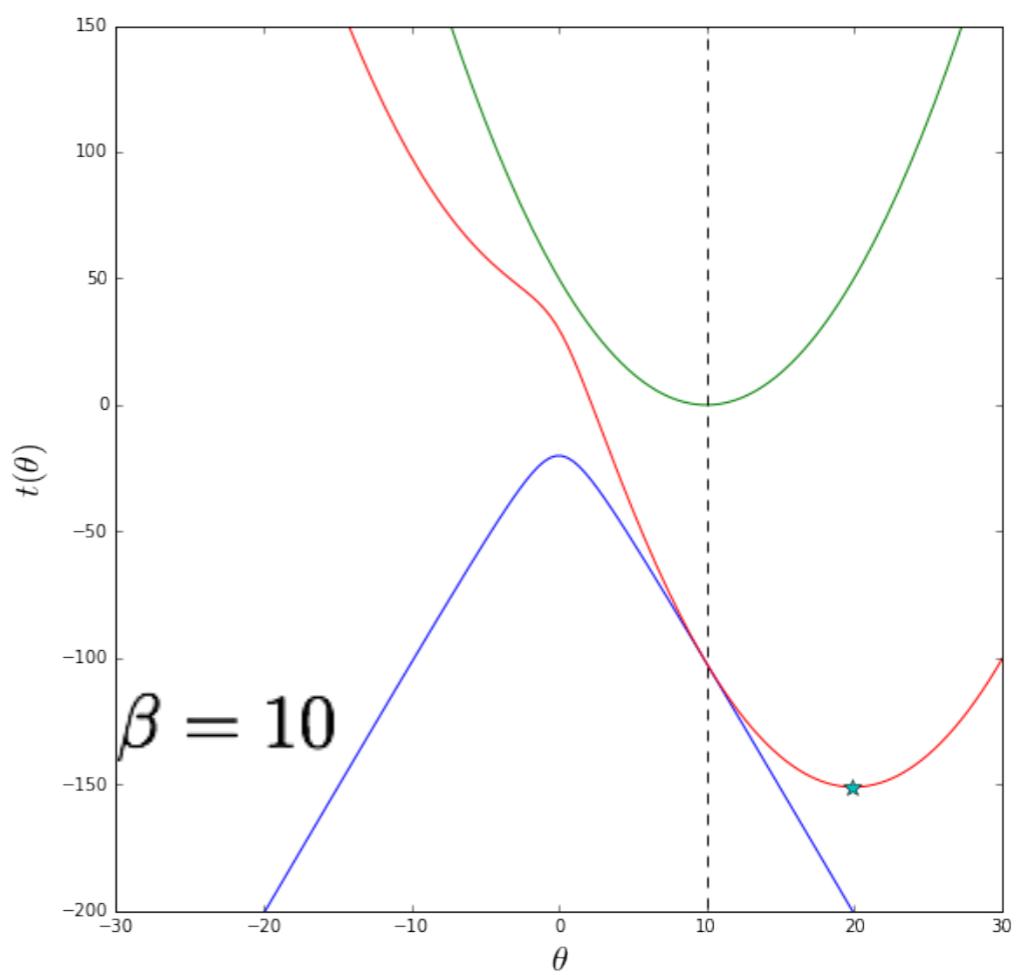
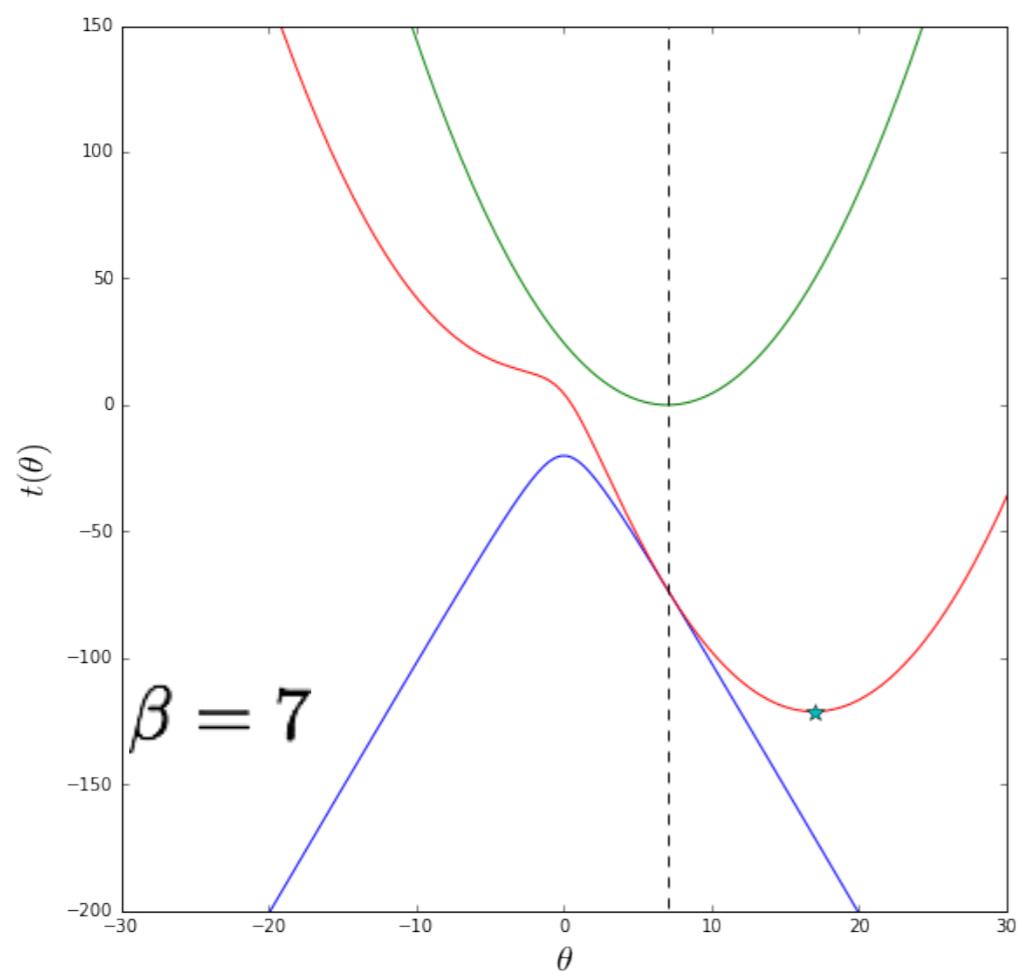
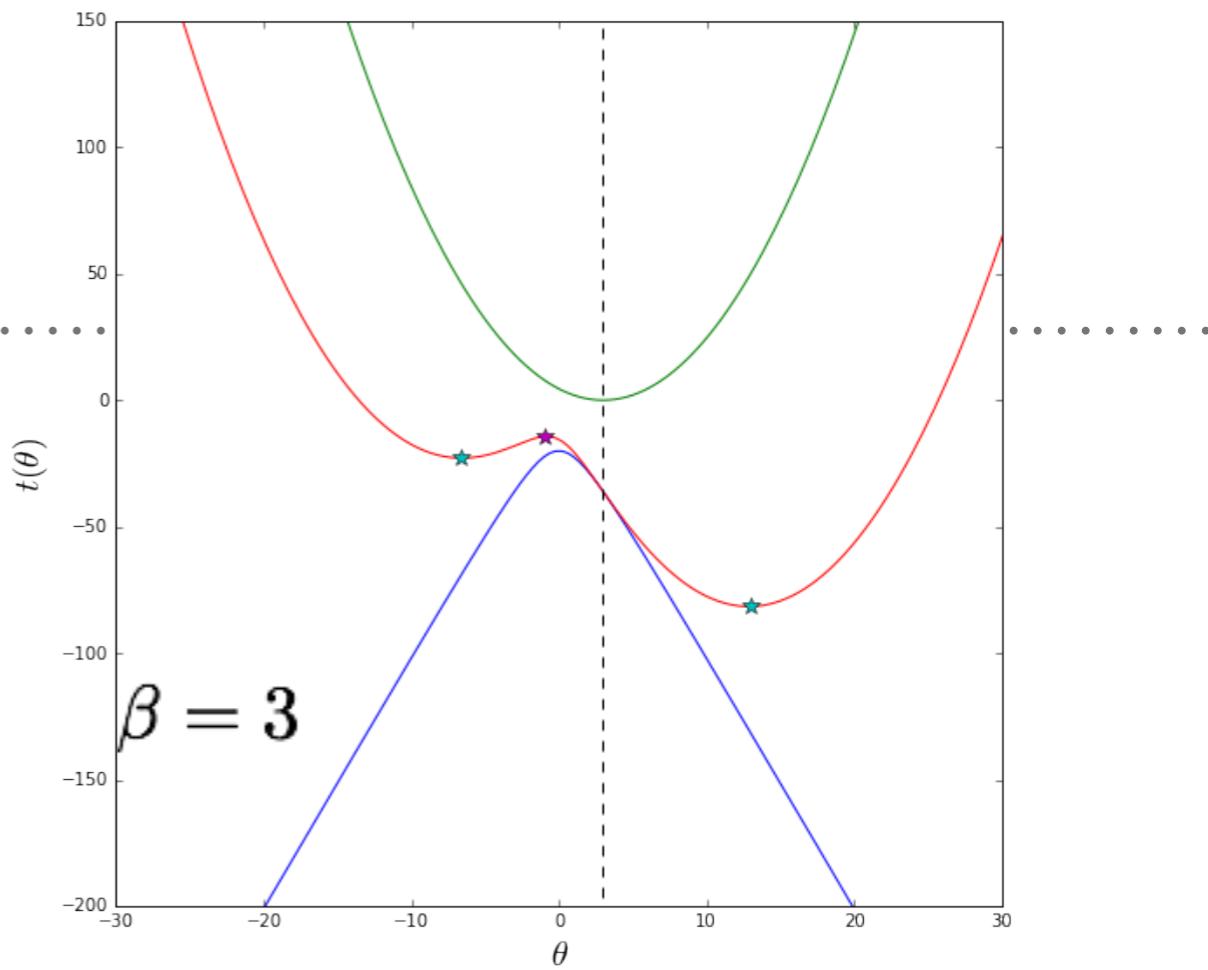
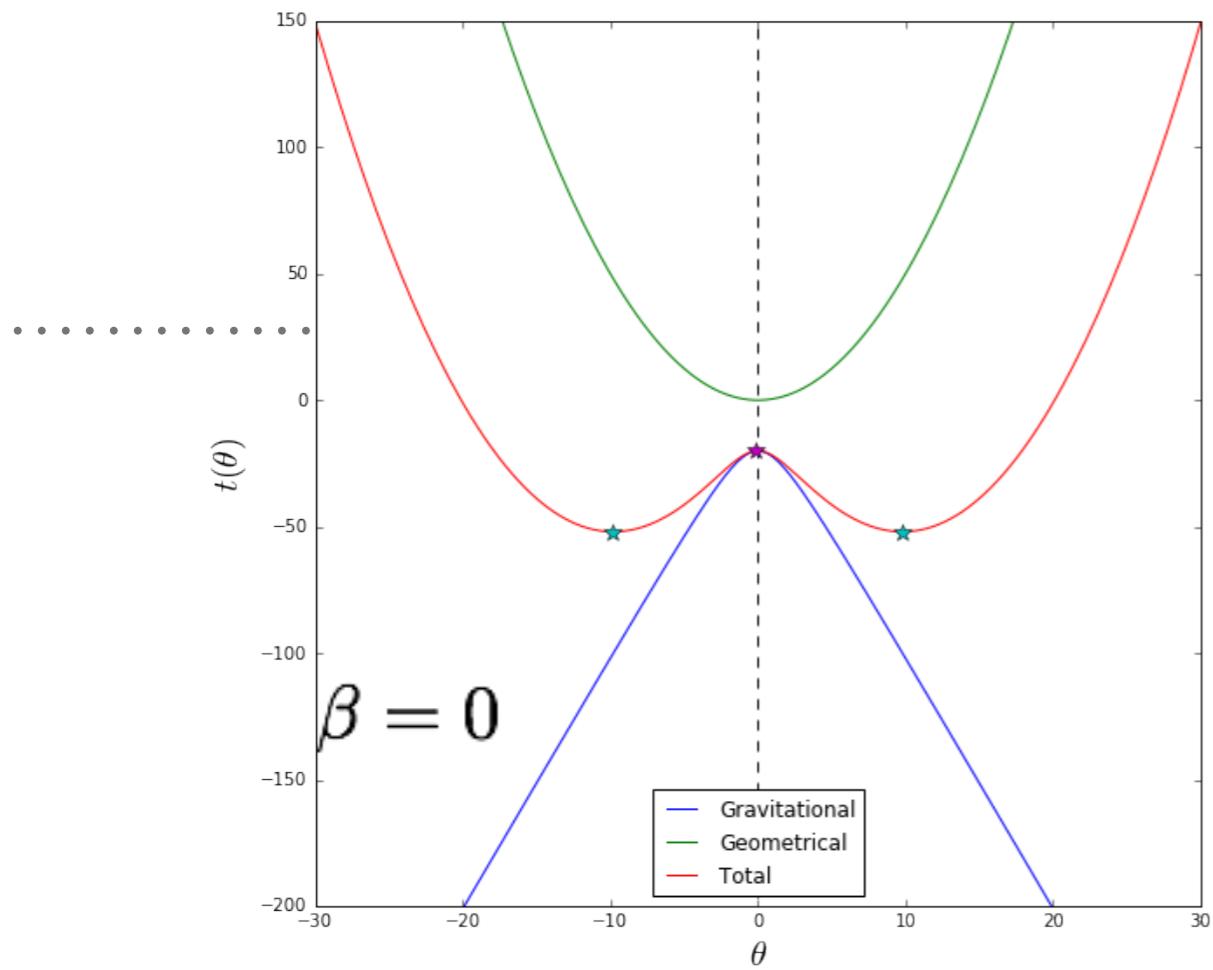
Last time, we worked with the toy potential:

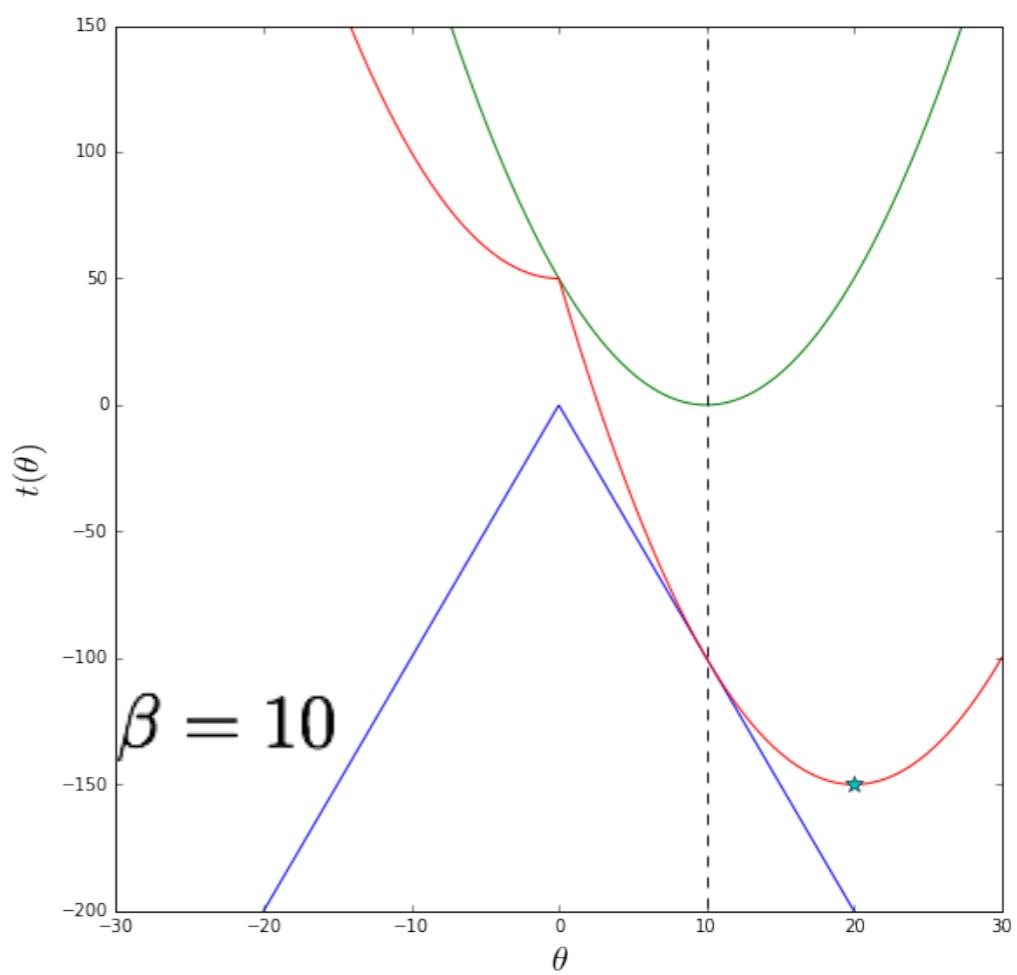
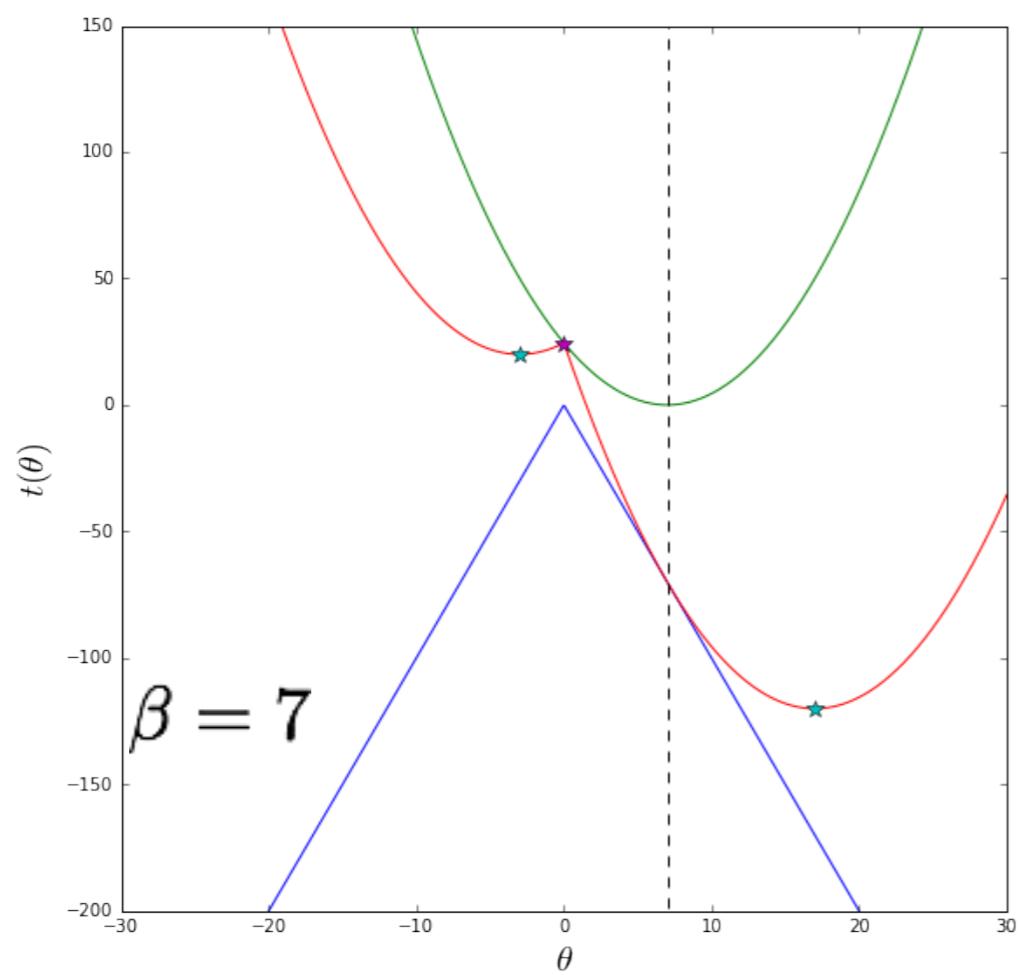
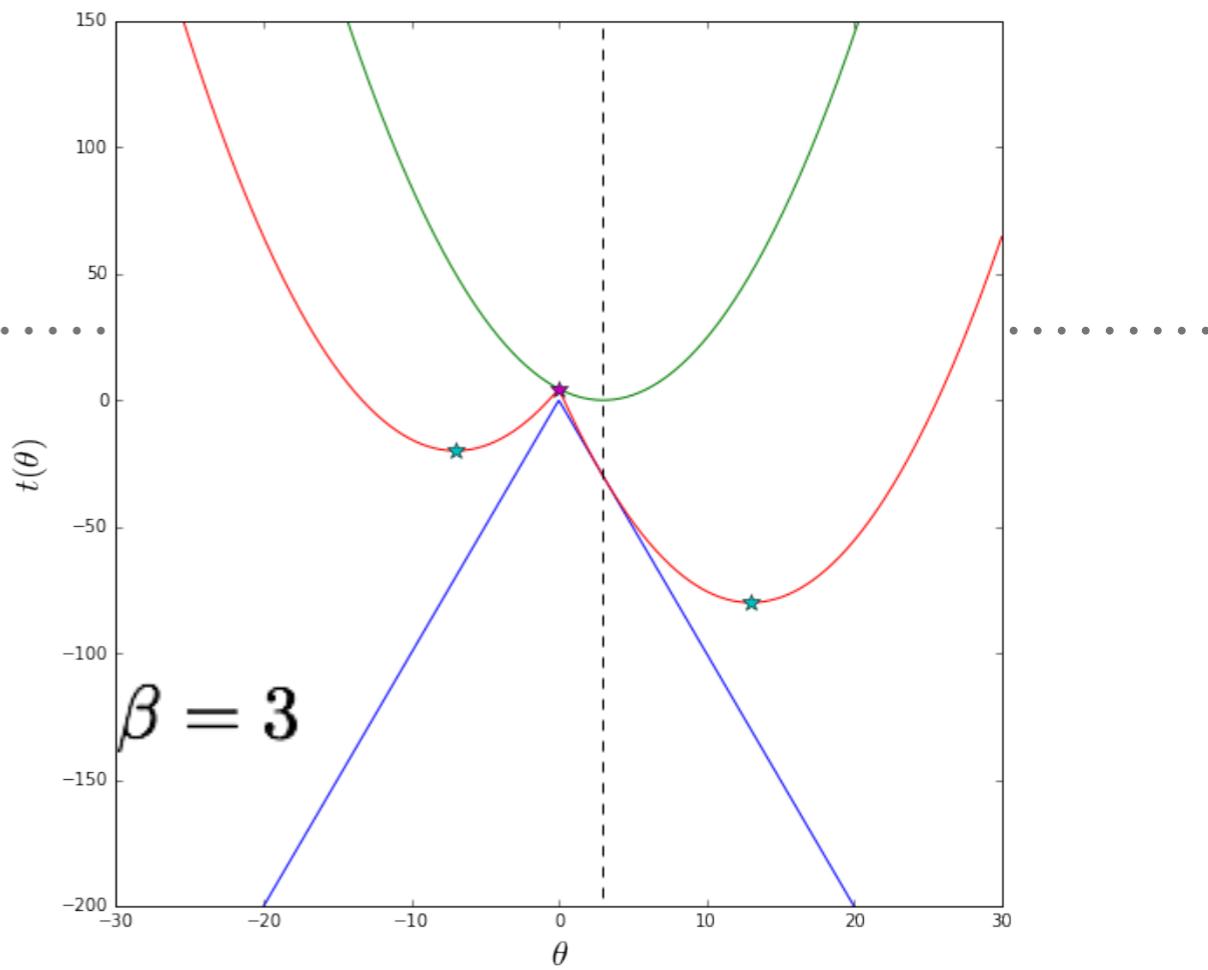
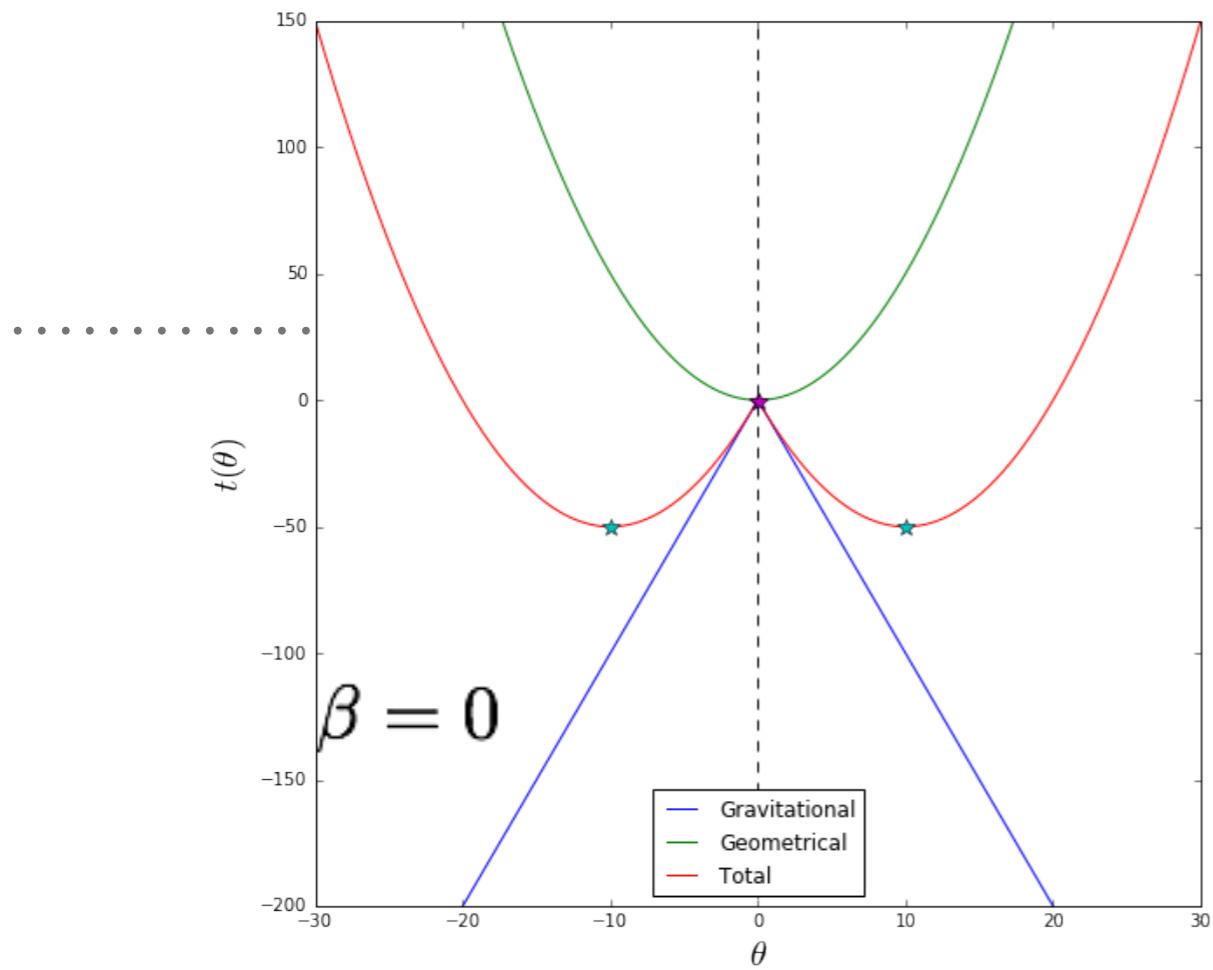
$$\psi(\theta) \propto \frac{1}{\sqrt{\theta^2 + \theta_c^2}}$$

Let's change it into:

$$\psi(\theta) \propto \frac{1}{|\theta|}$$

The lens model is the same as before, but the core has been removed



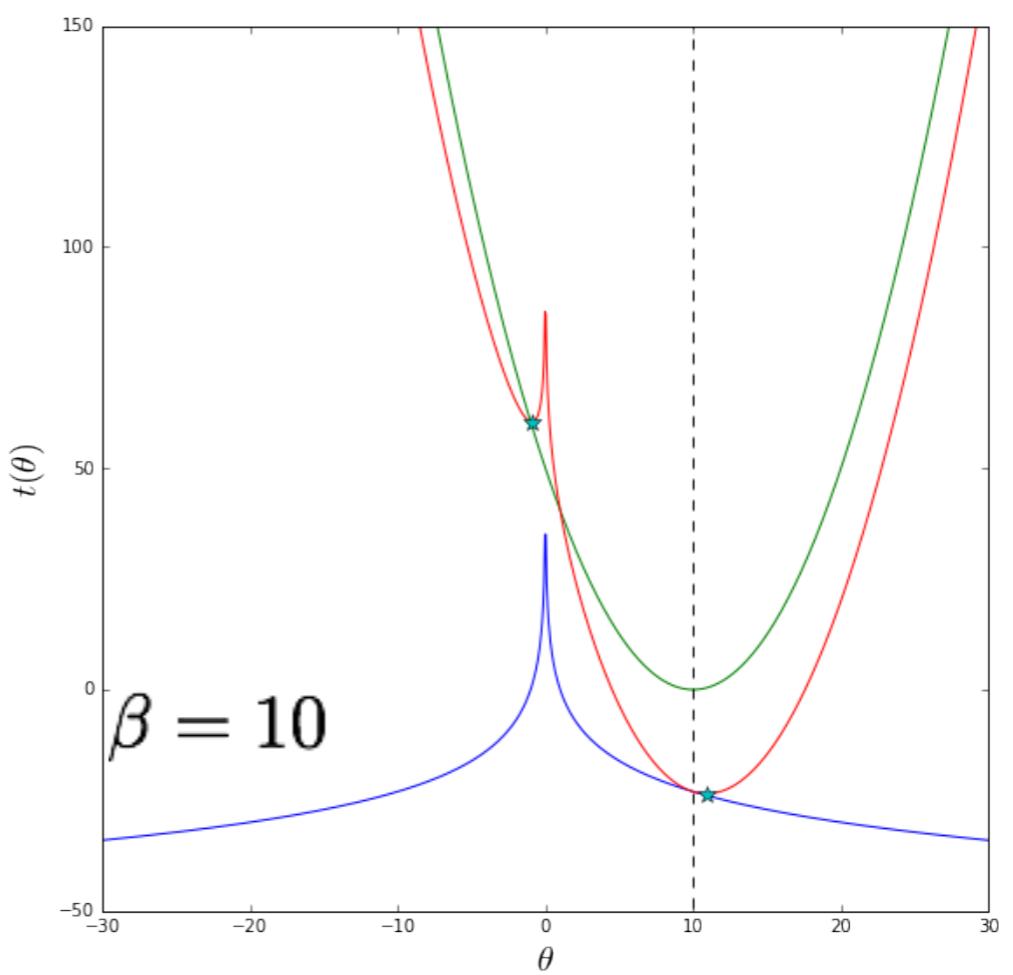
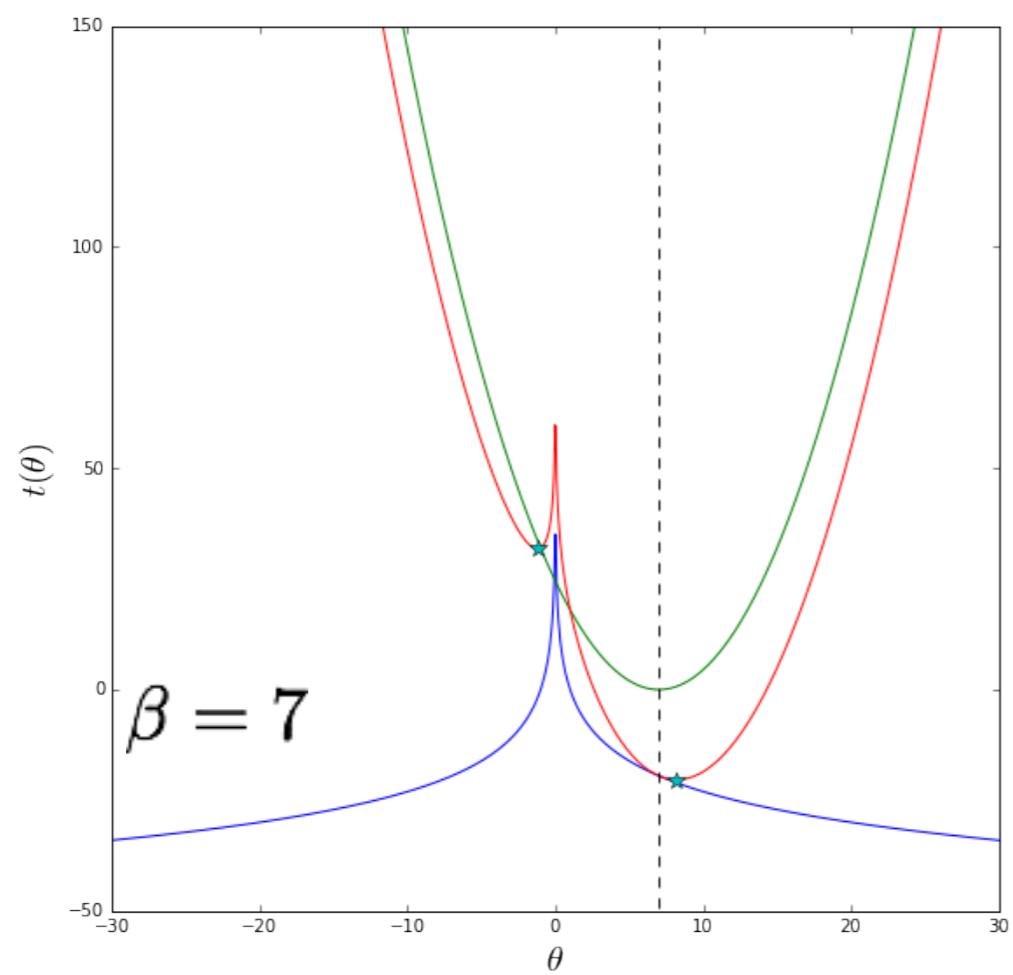
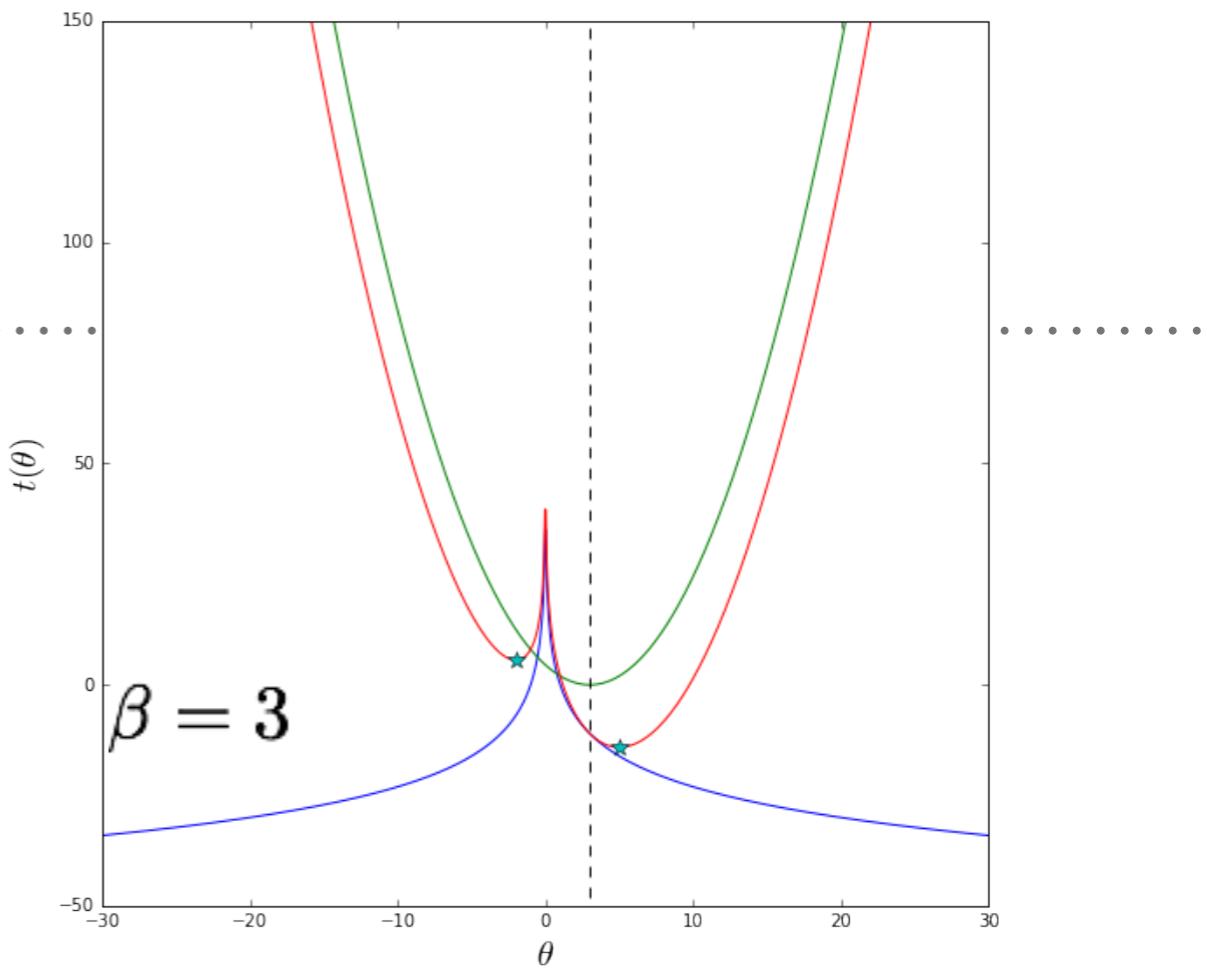
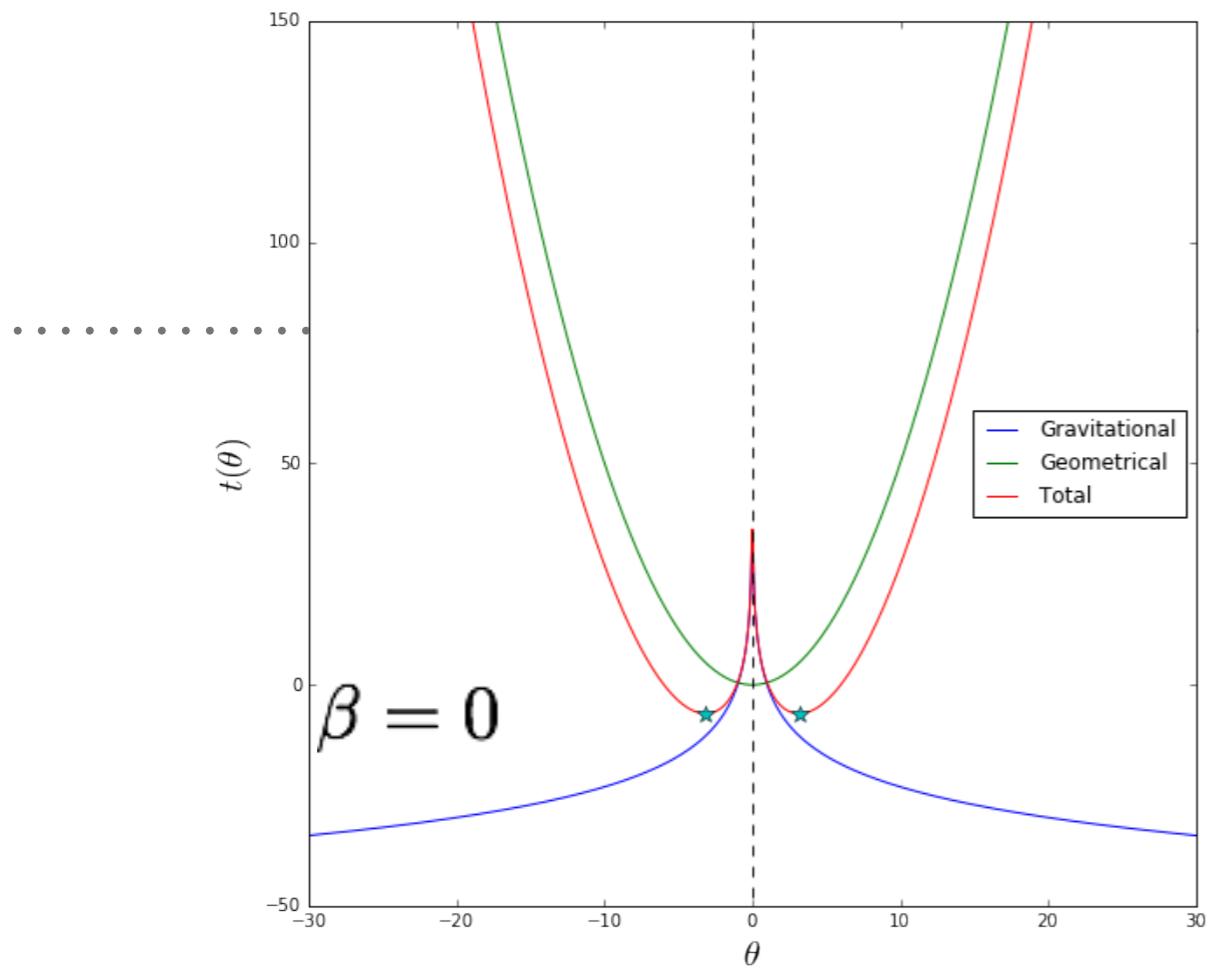


EXAMPLE OF TIME DELAY SURFACE

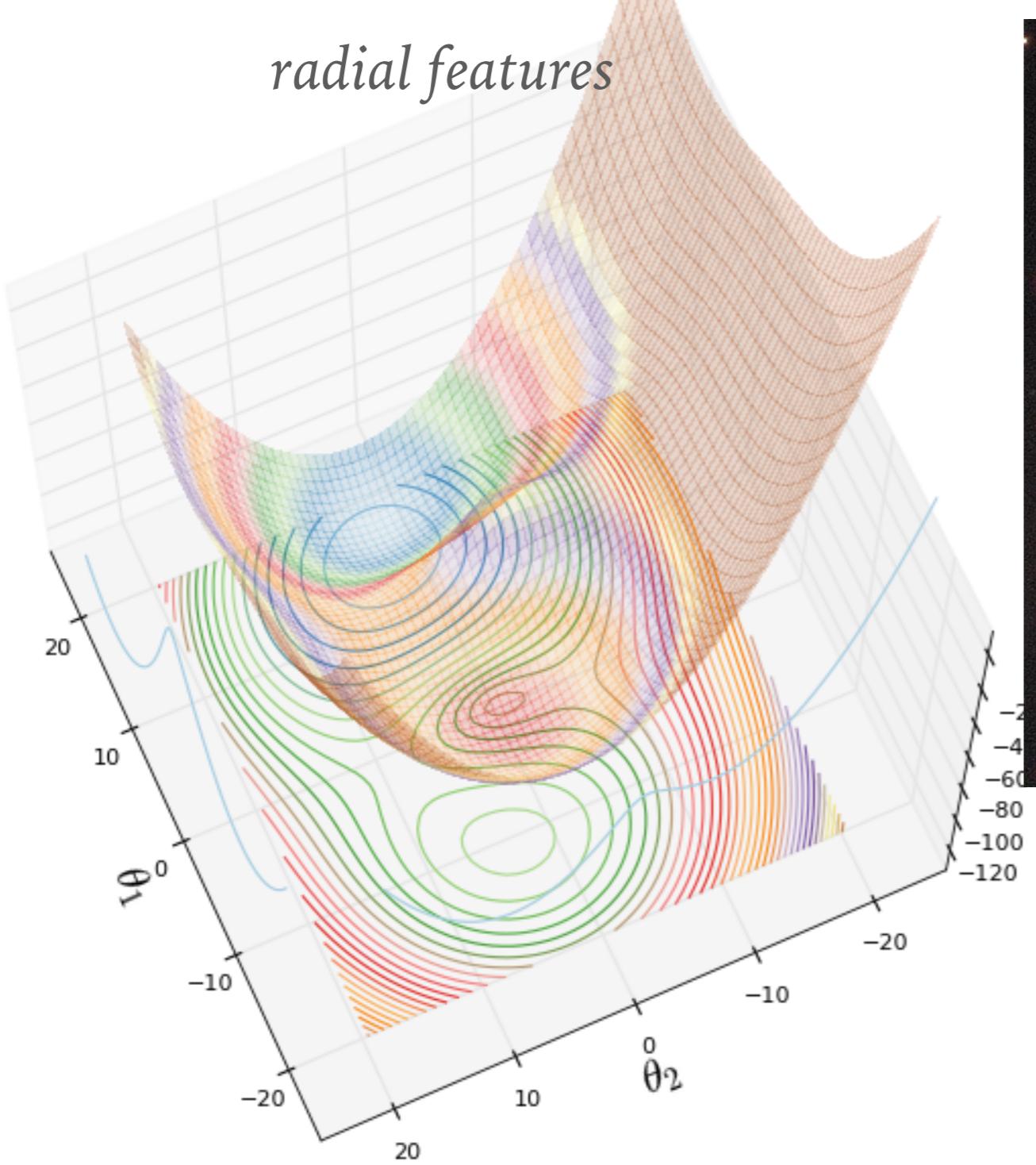
Yet another potential

$$\psi(\theta) \propto \ln(|\theta|)$$

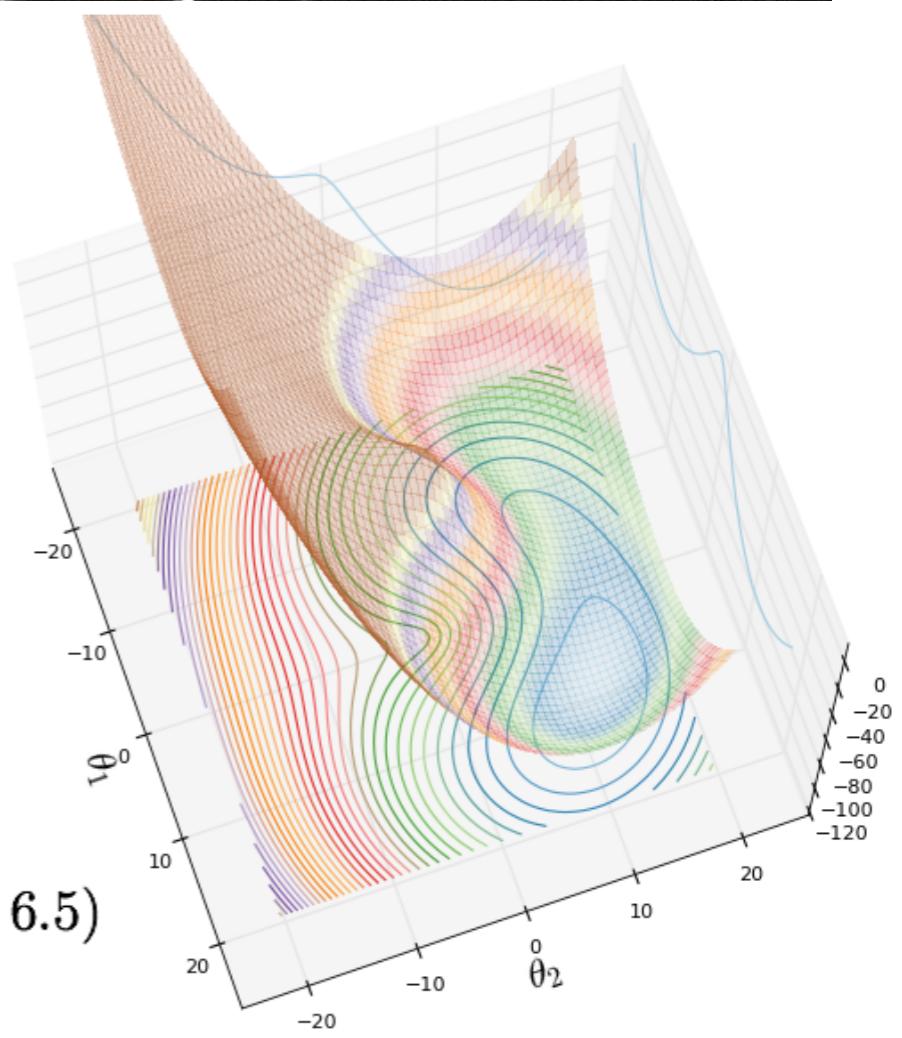
This is the lensing potential of the point mass...



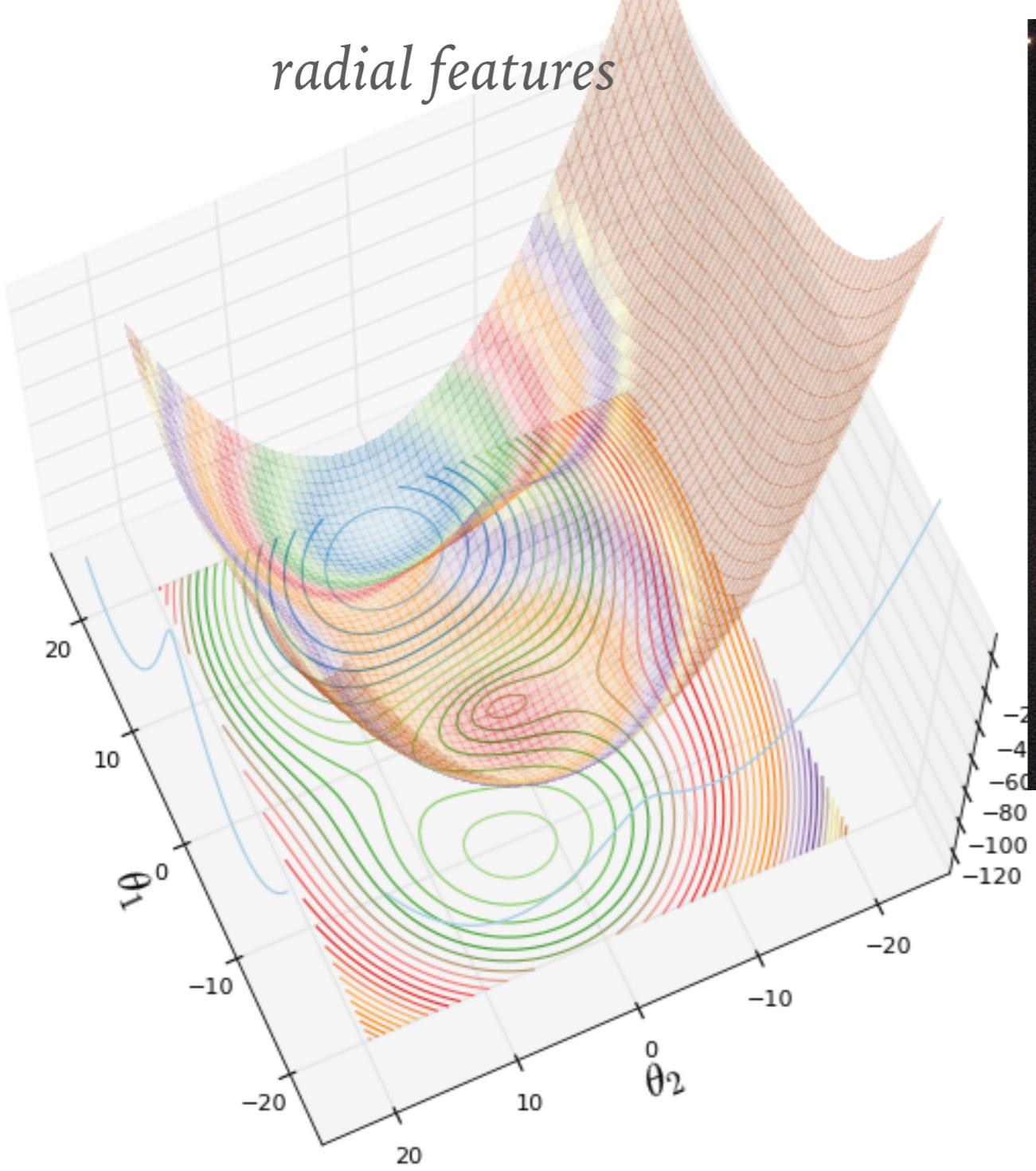
radial features



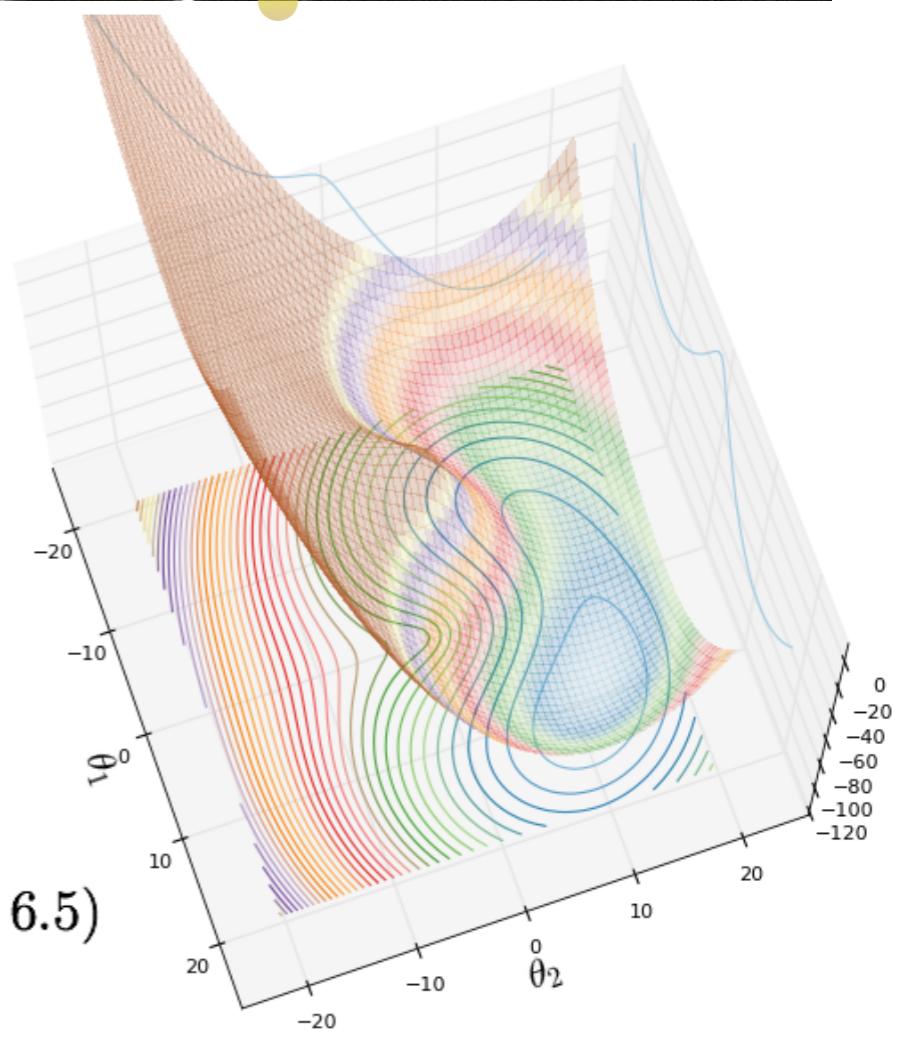
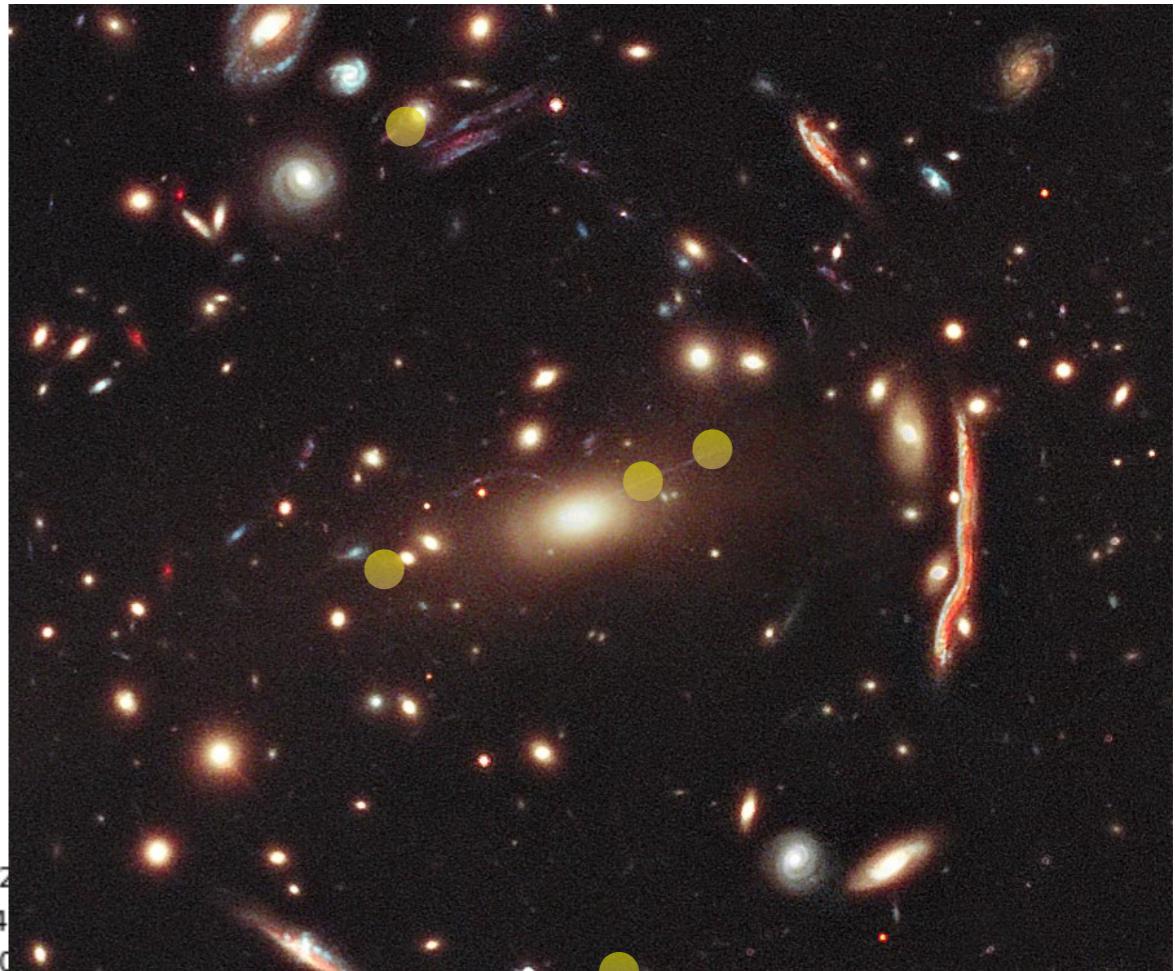
$$\vec{\beta} = (3, 3)$$
$$\epsilon = 0.3$$

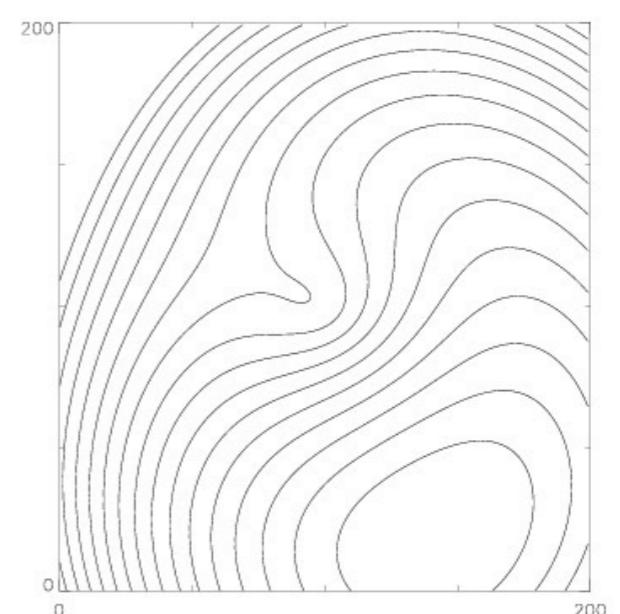
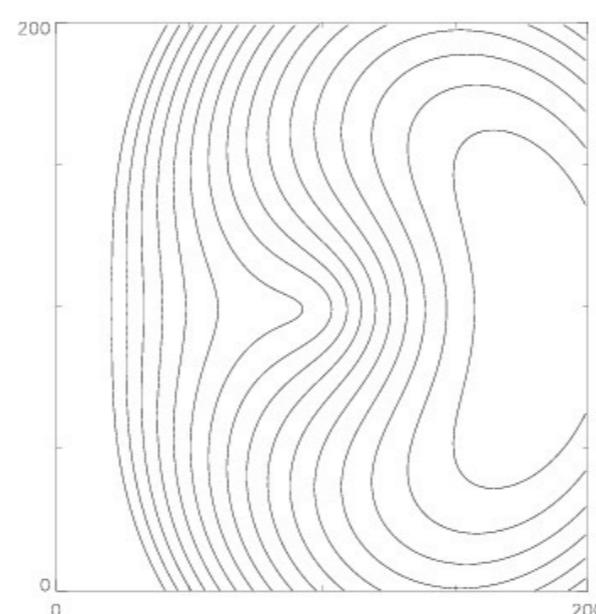
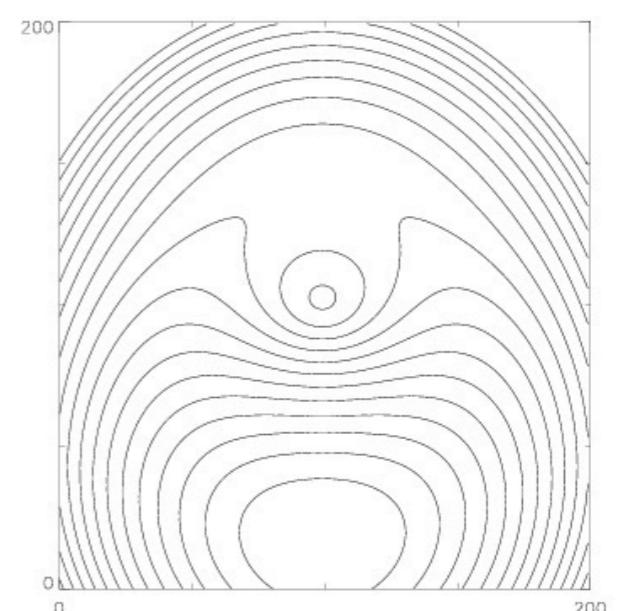
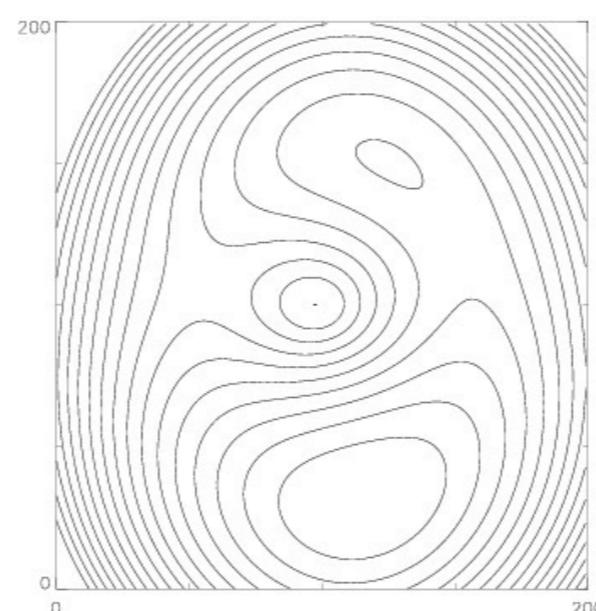
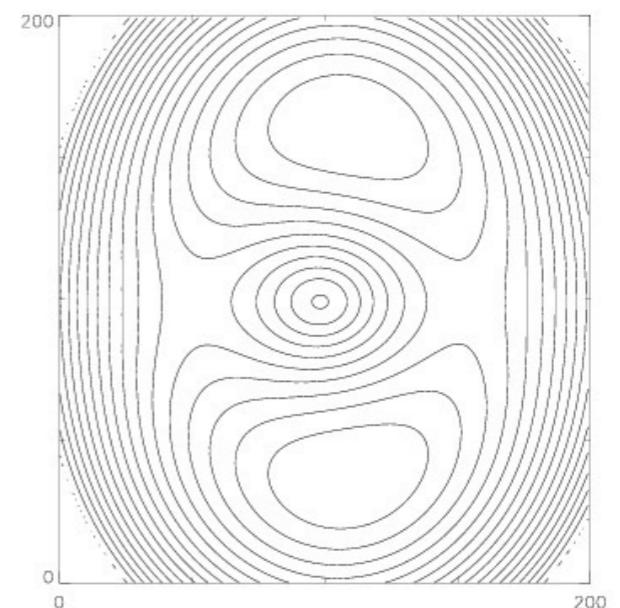
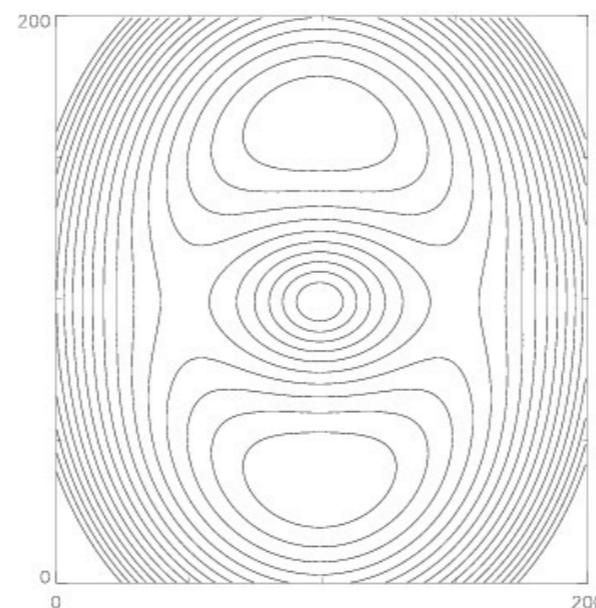


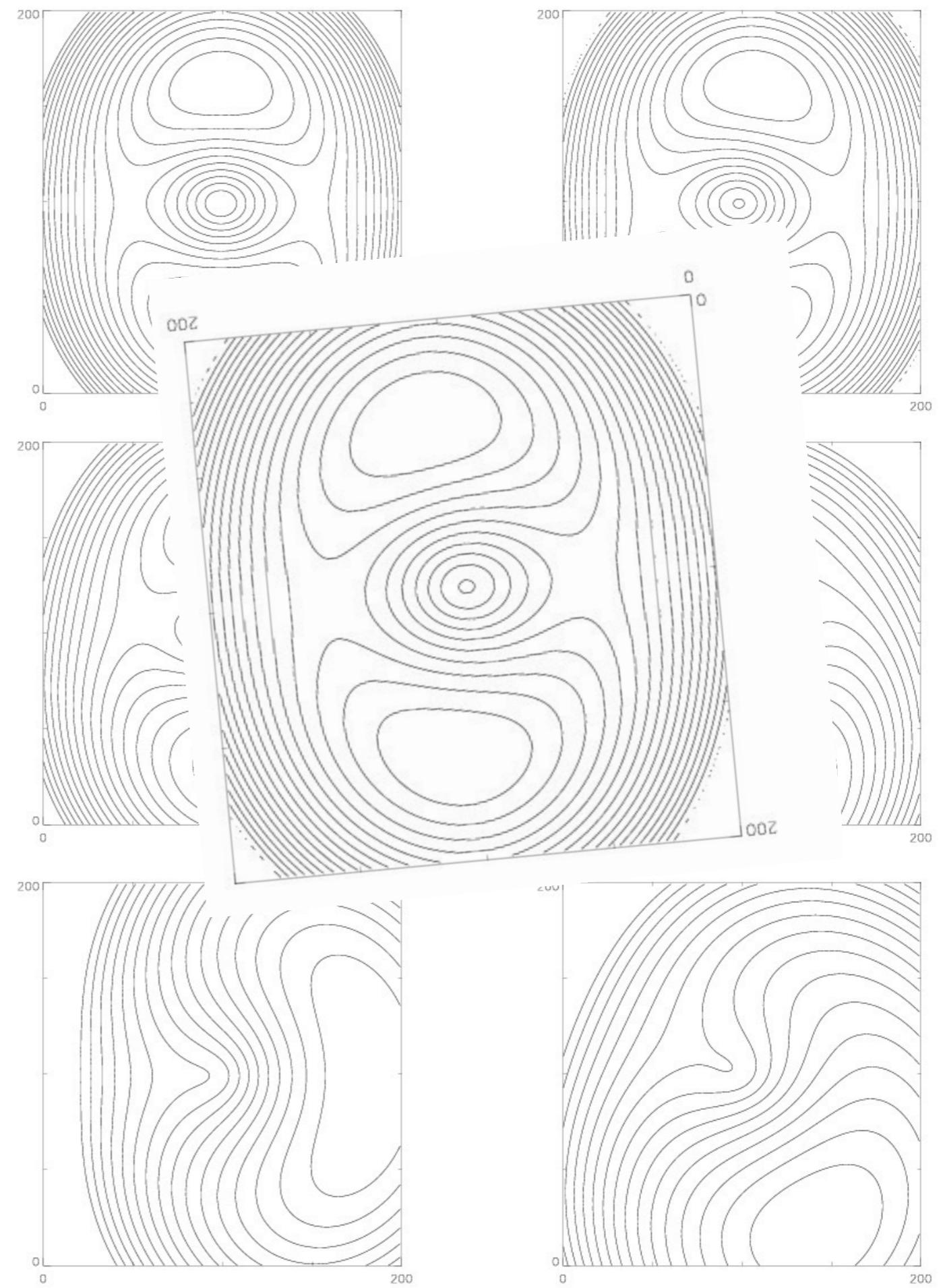
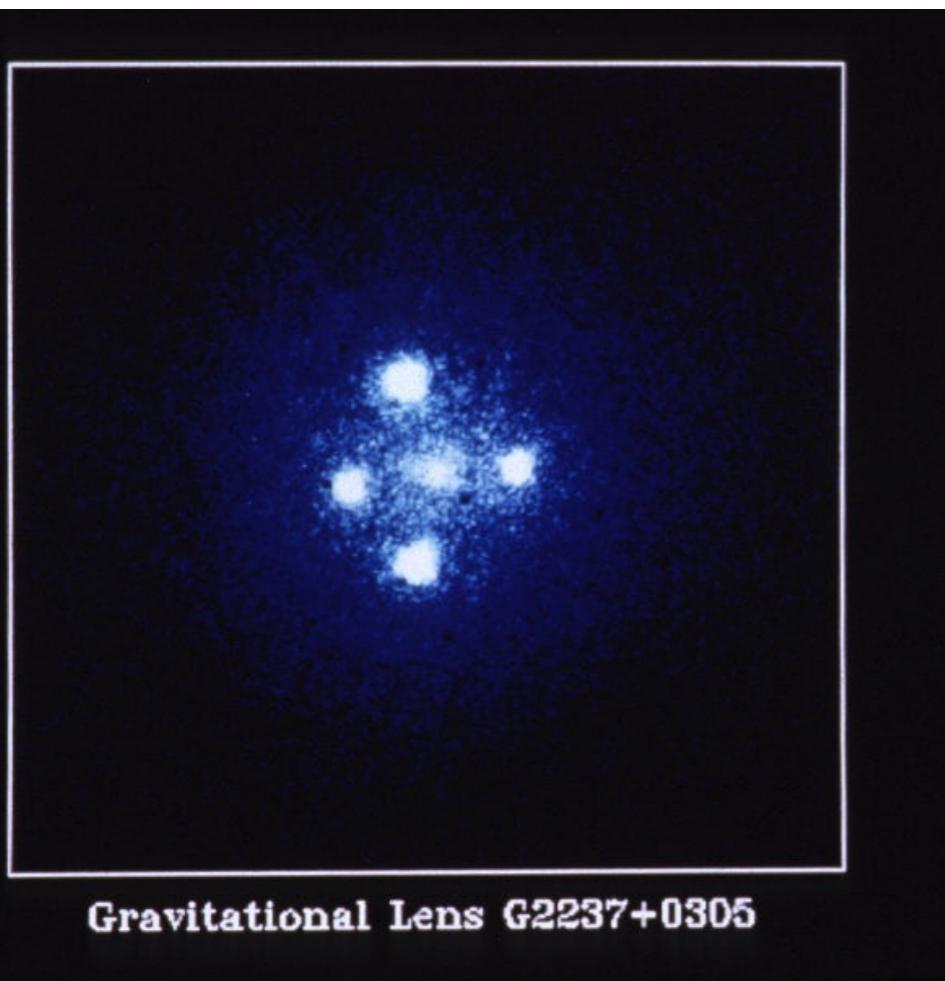
radial features

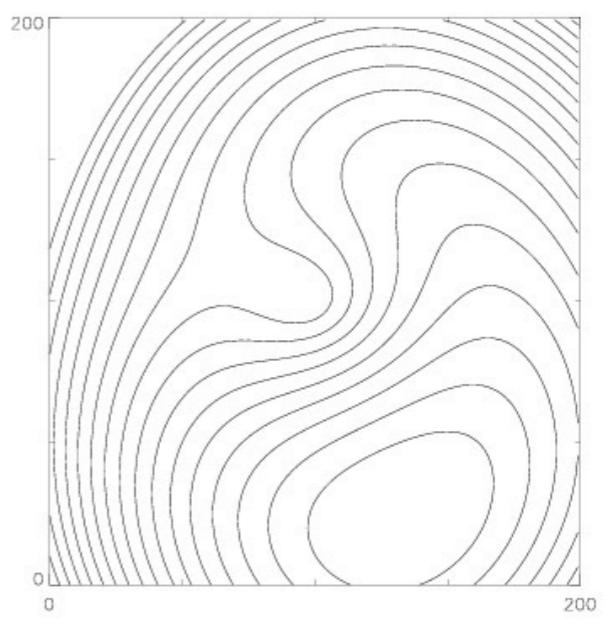
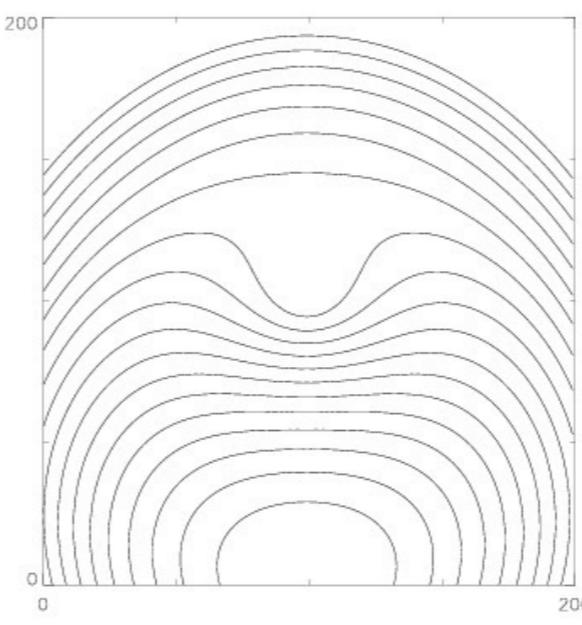
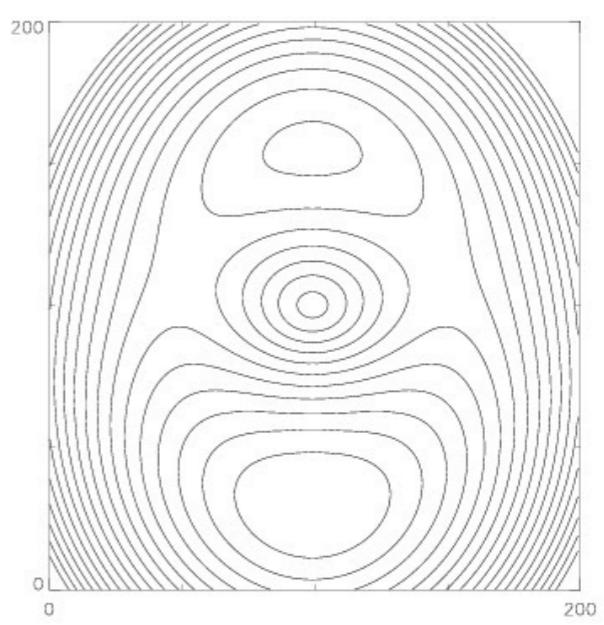
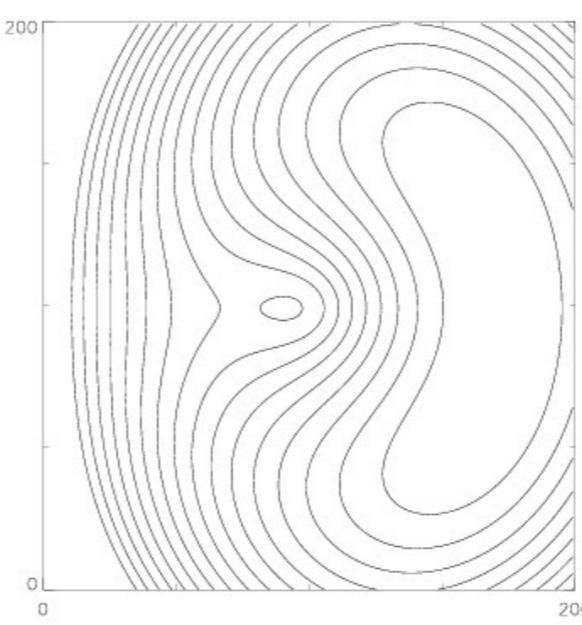
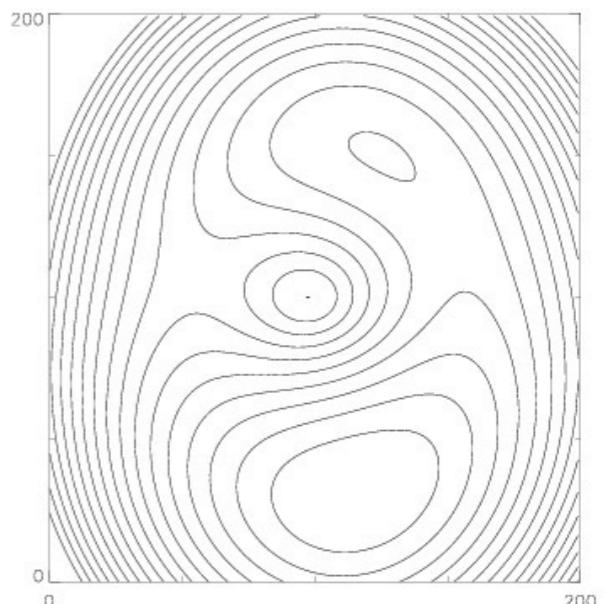
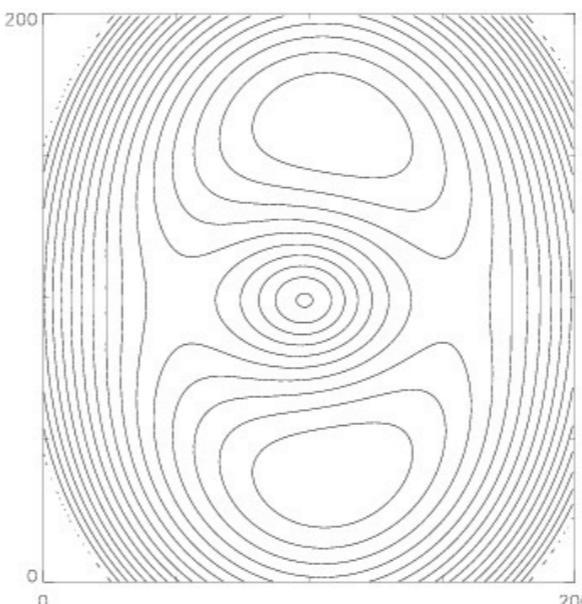
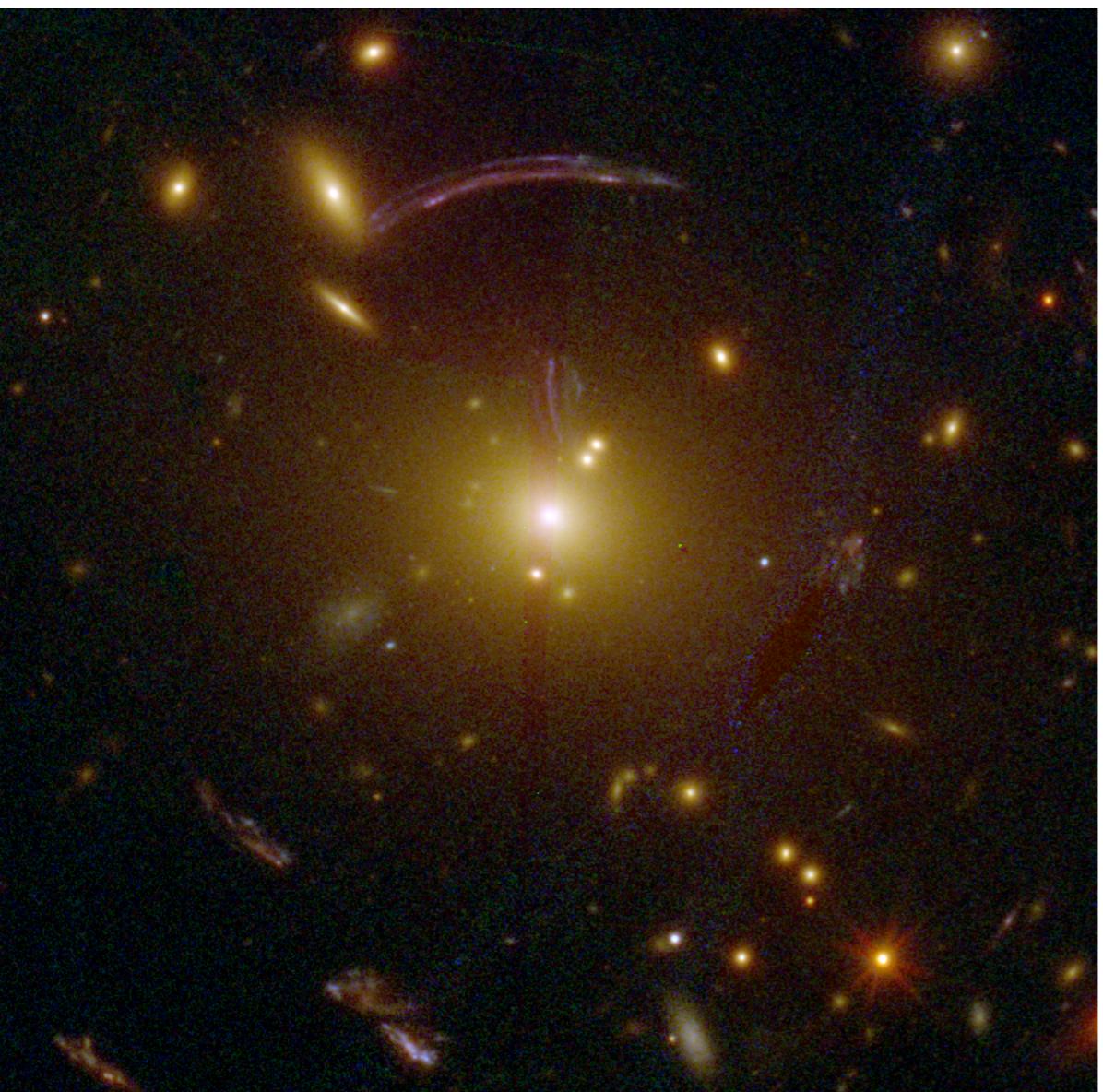


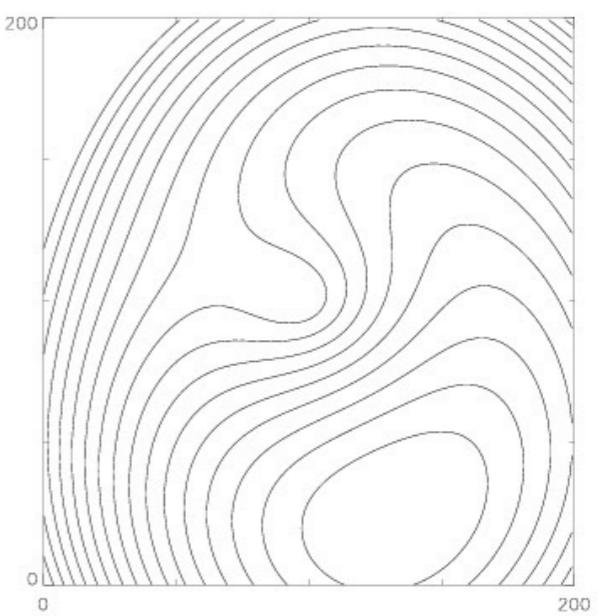
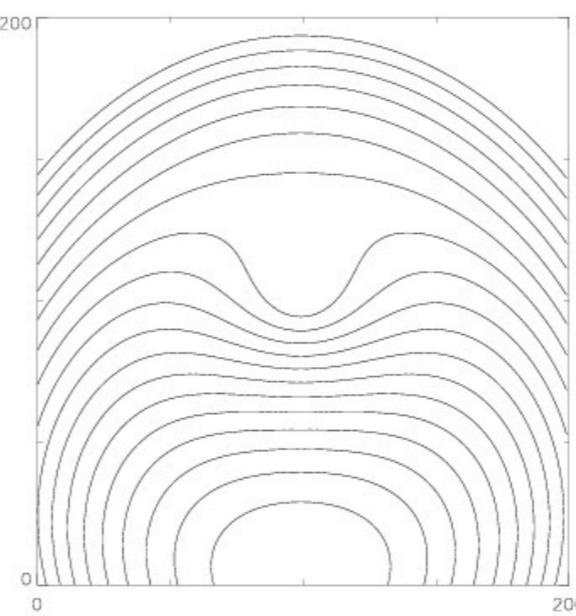
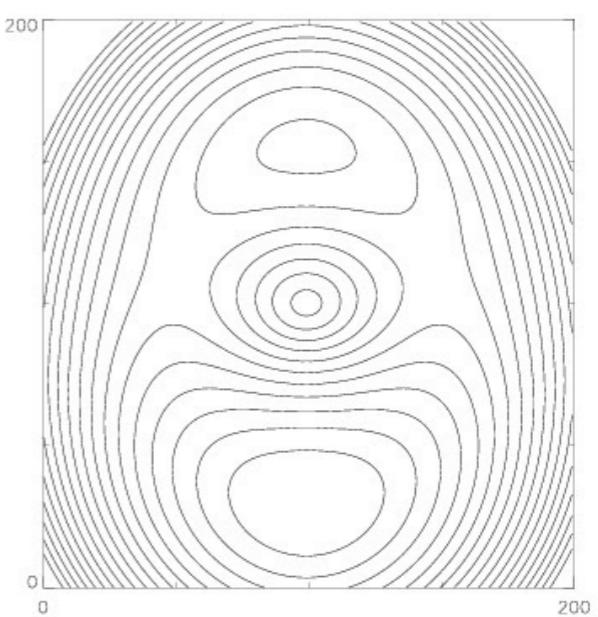
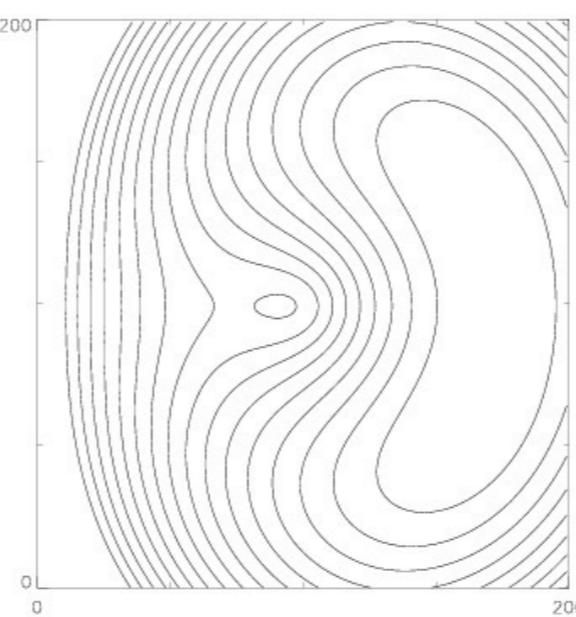
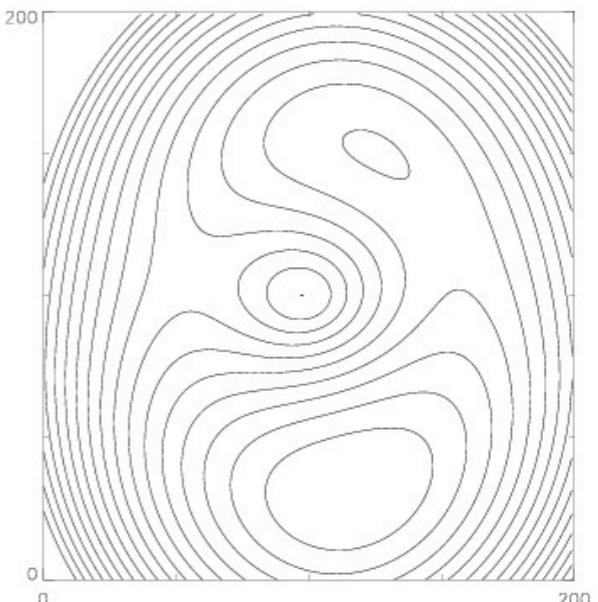
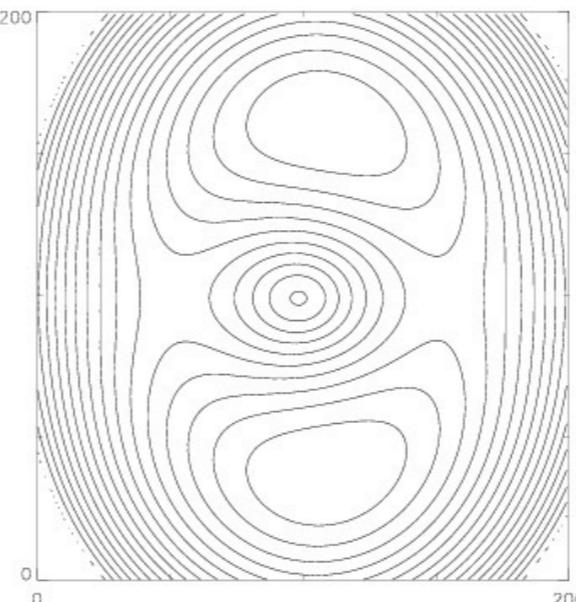
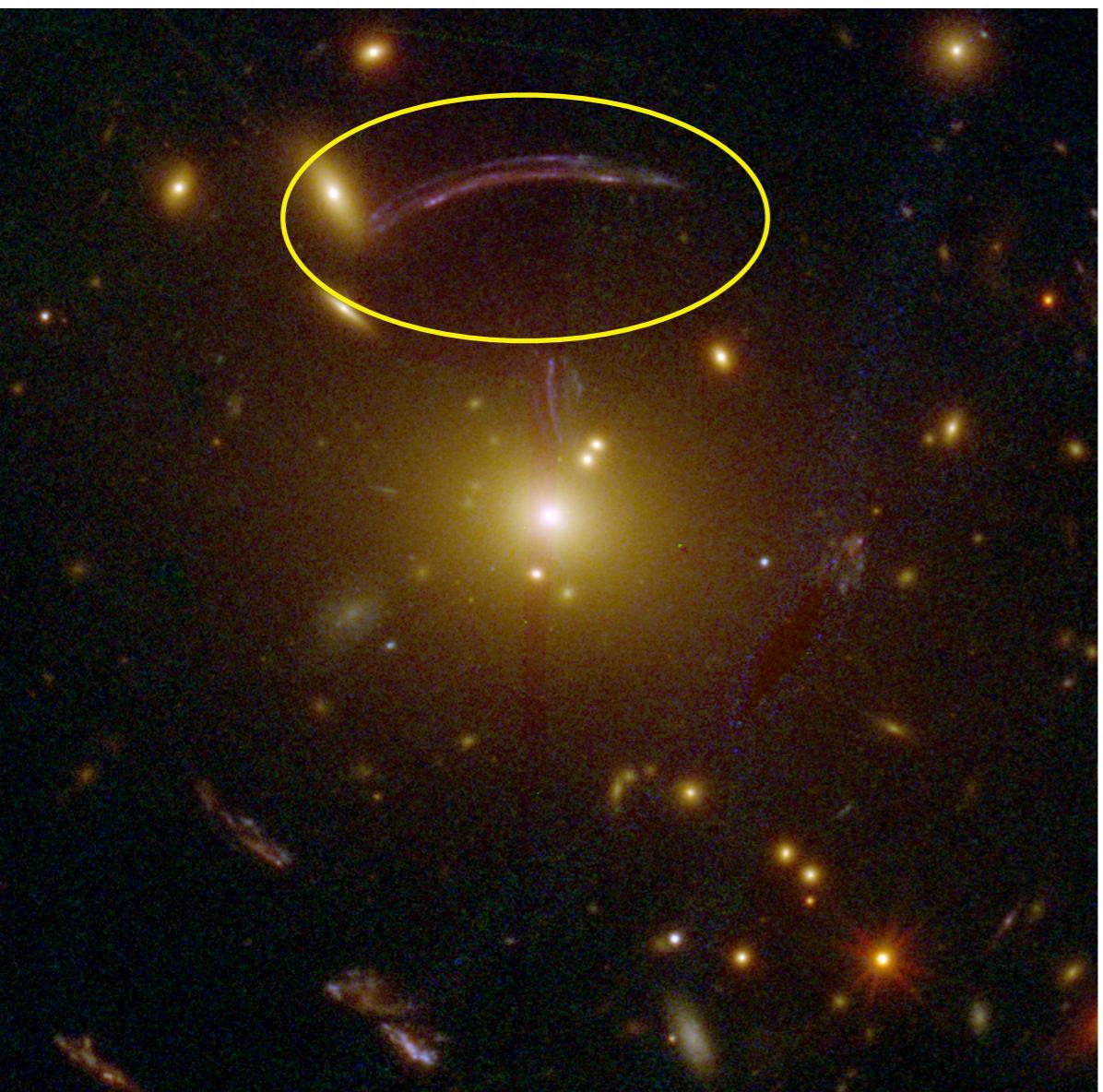
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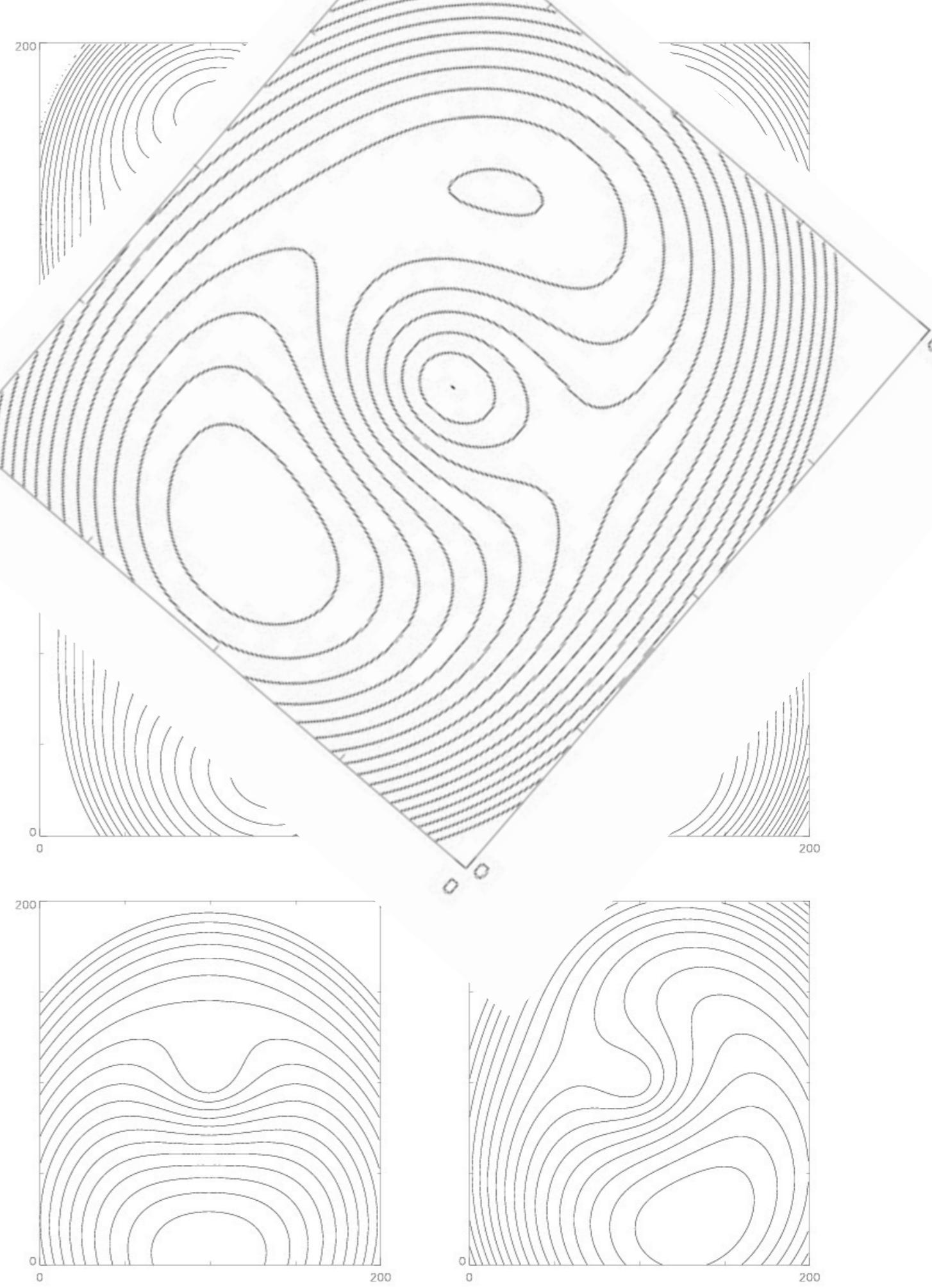
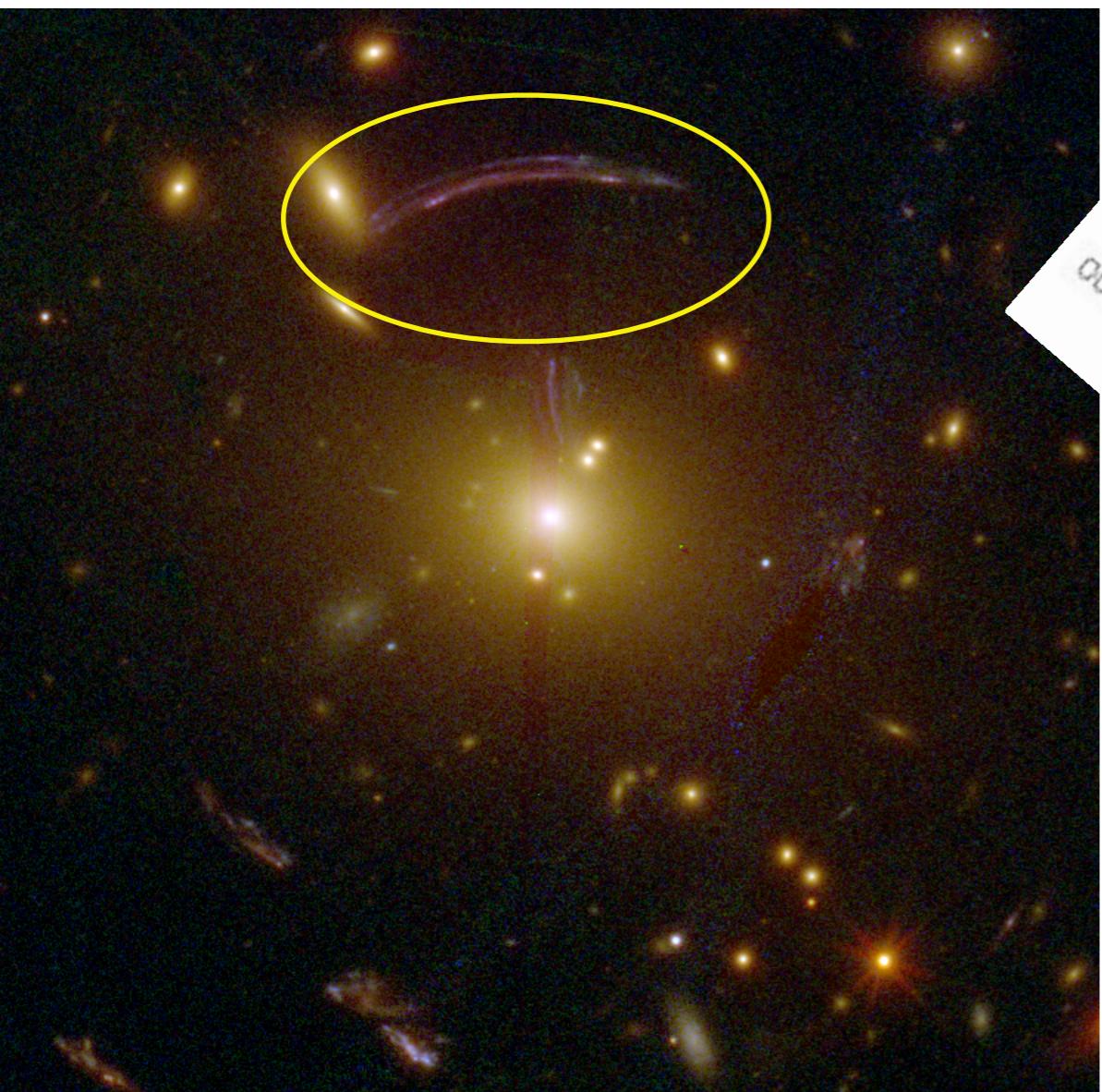


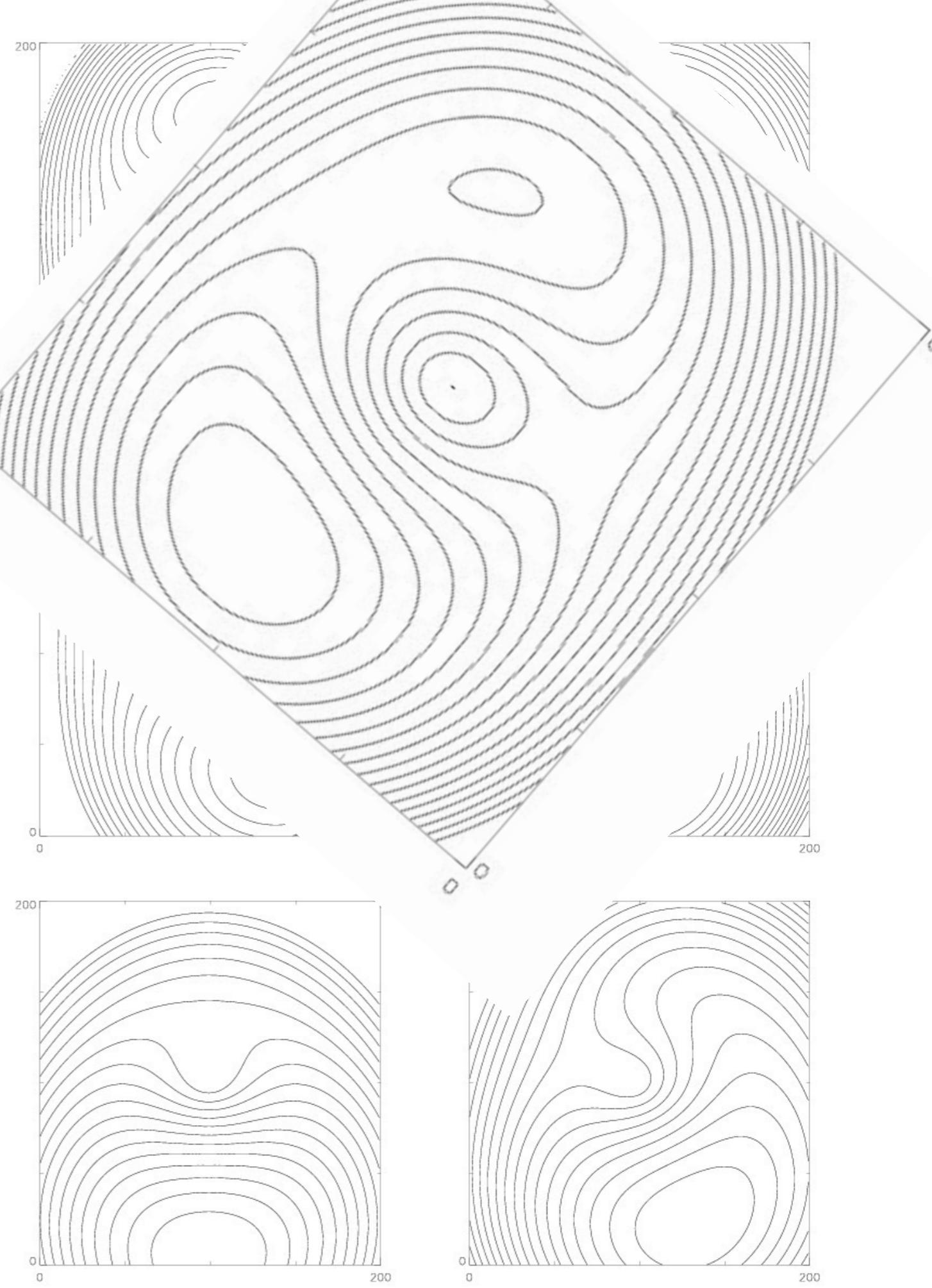
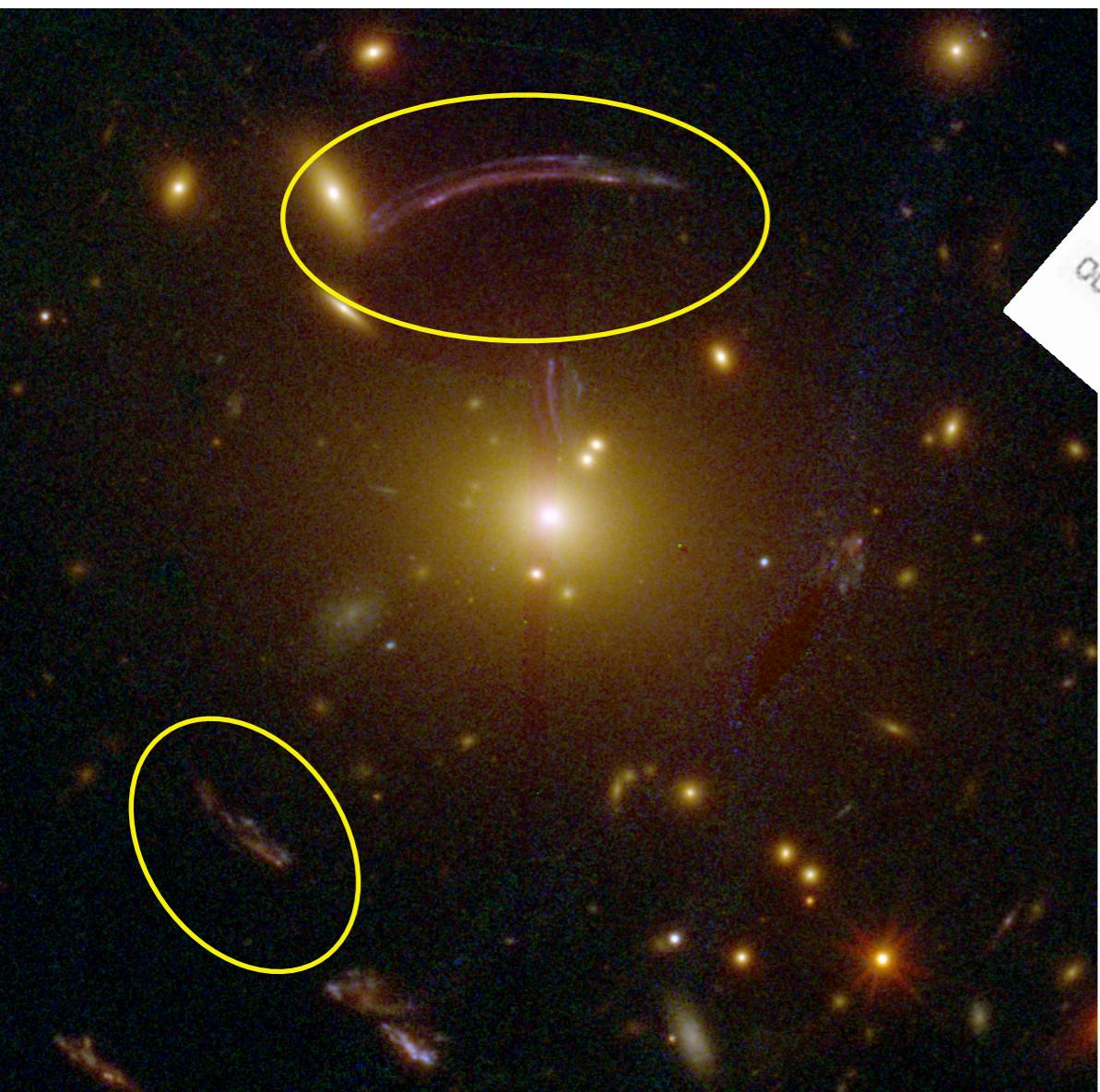


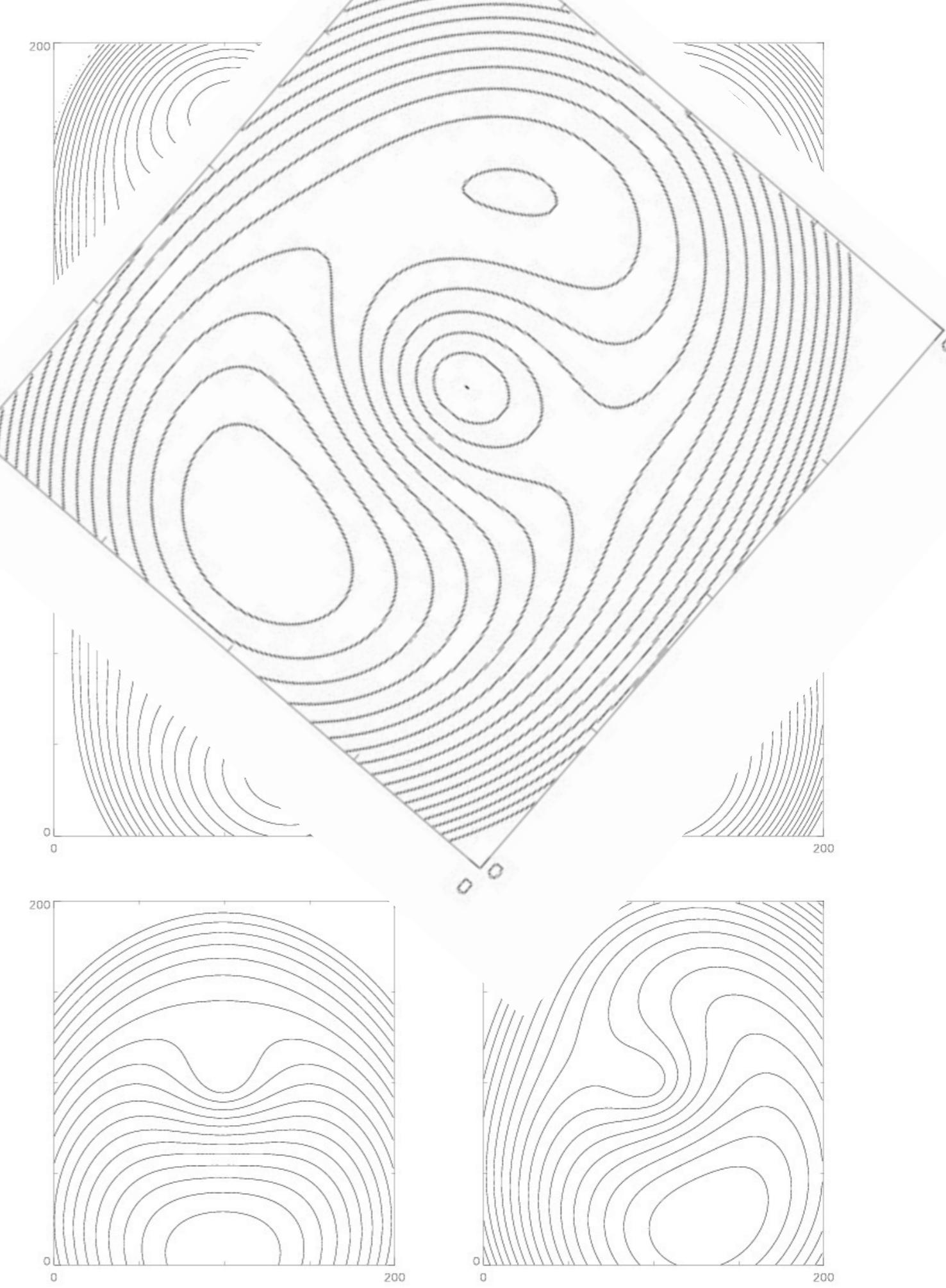
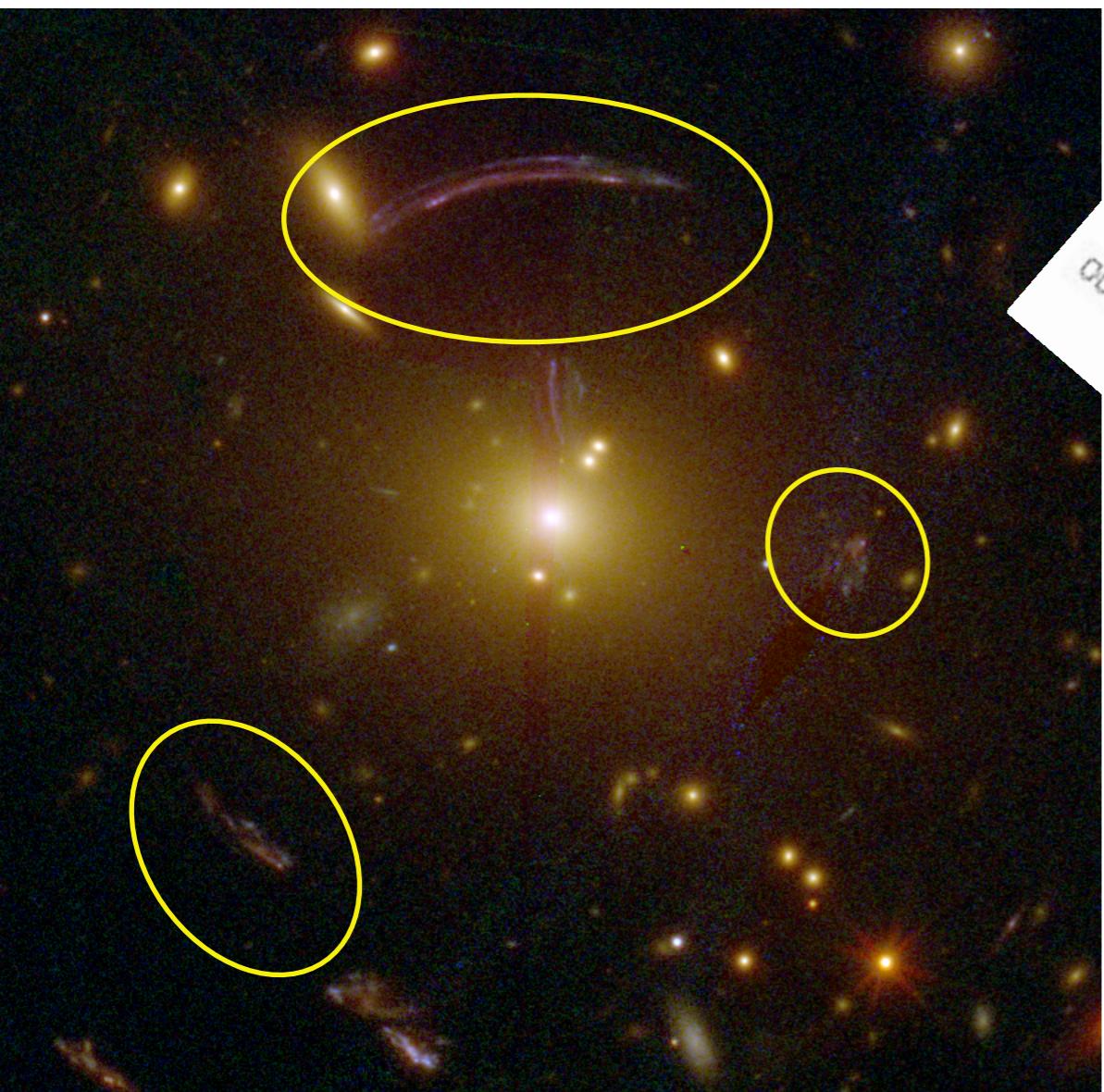


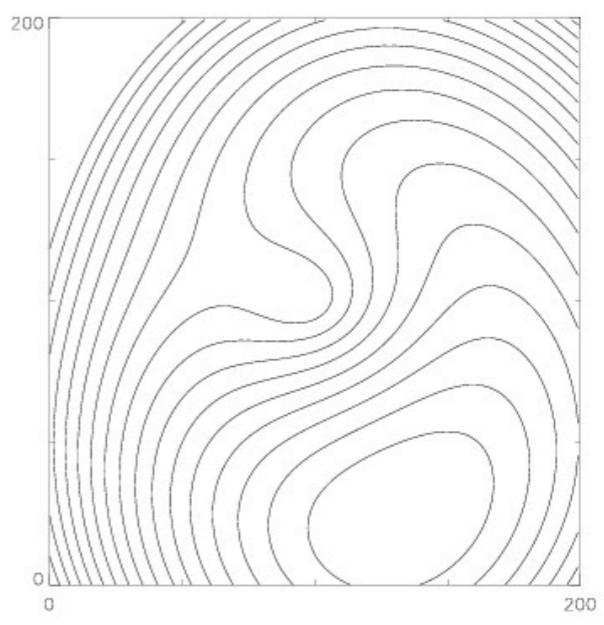
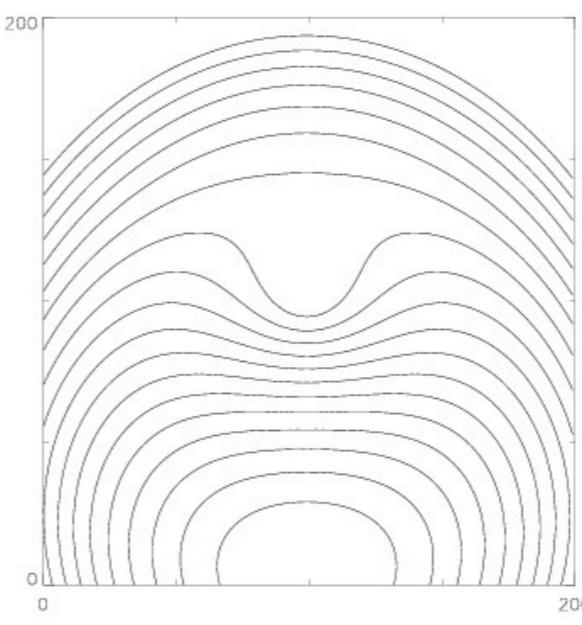
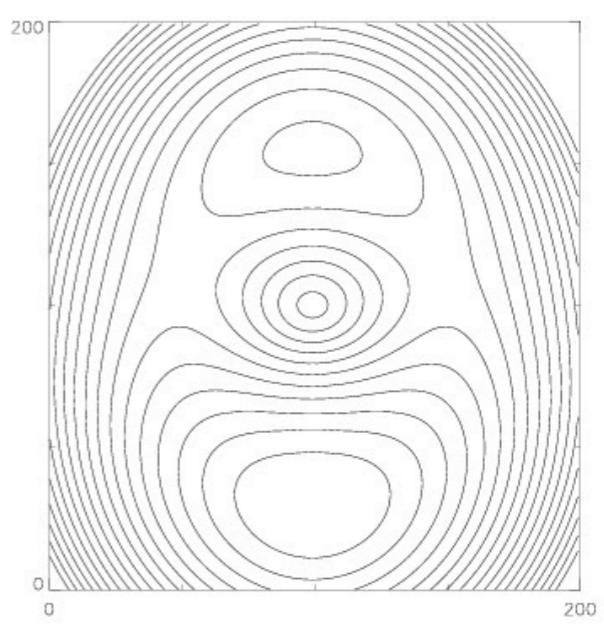
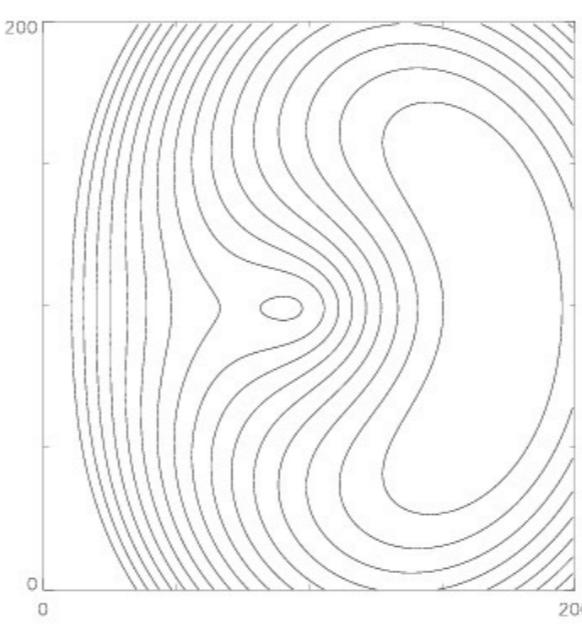
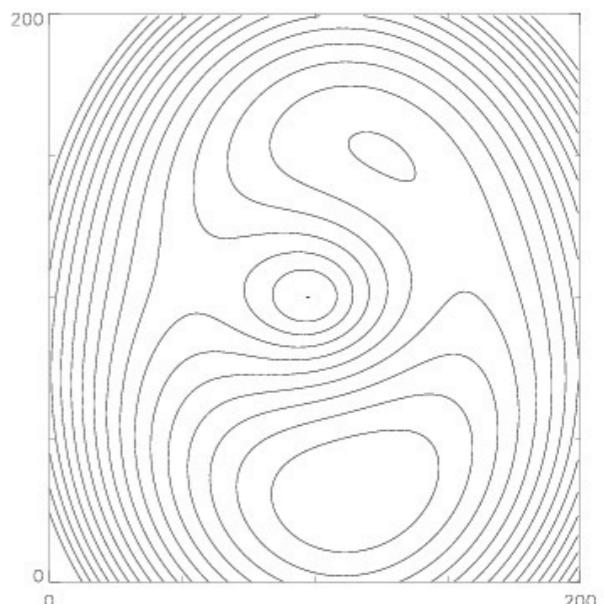
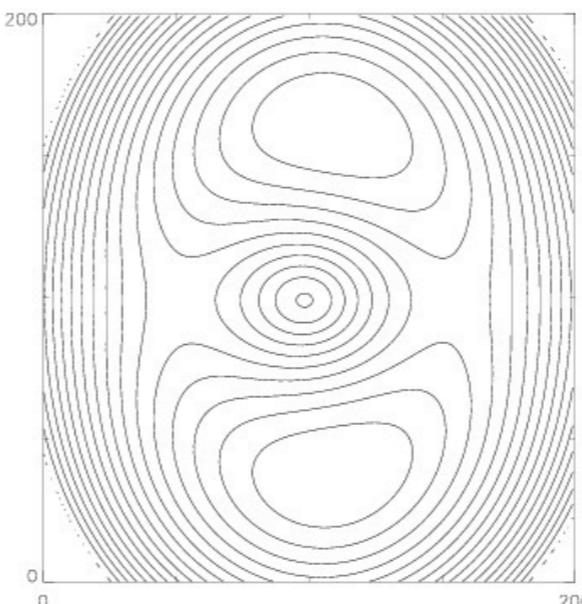
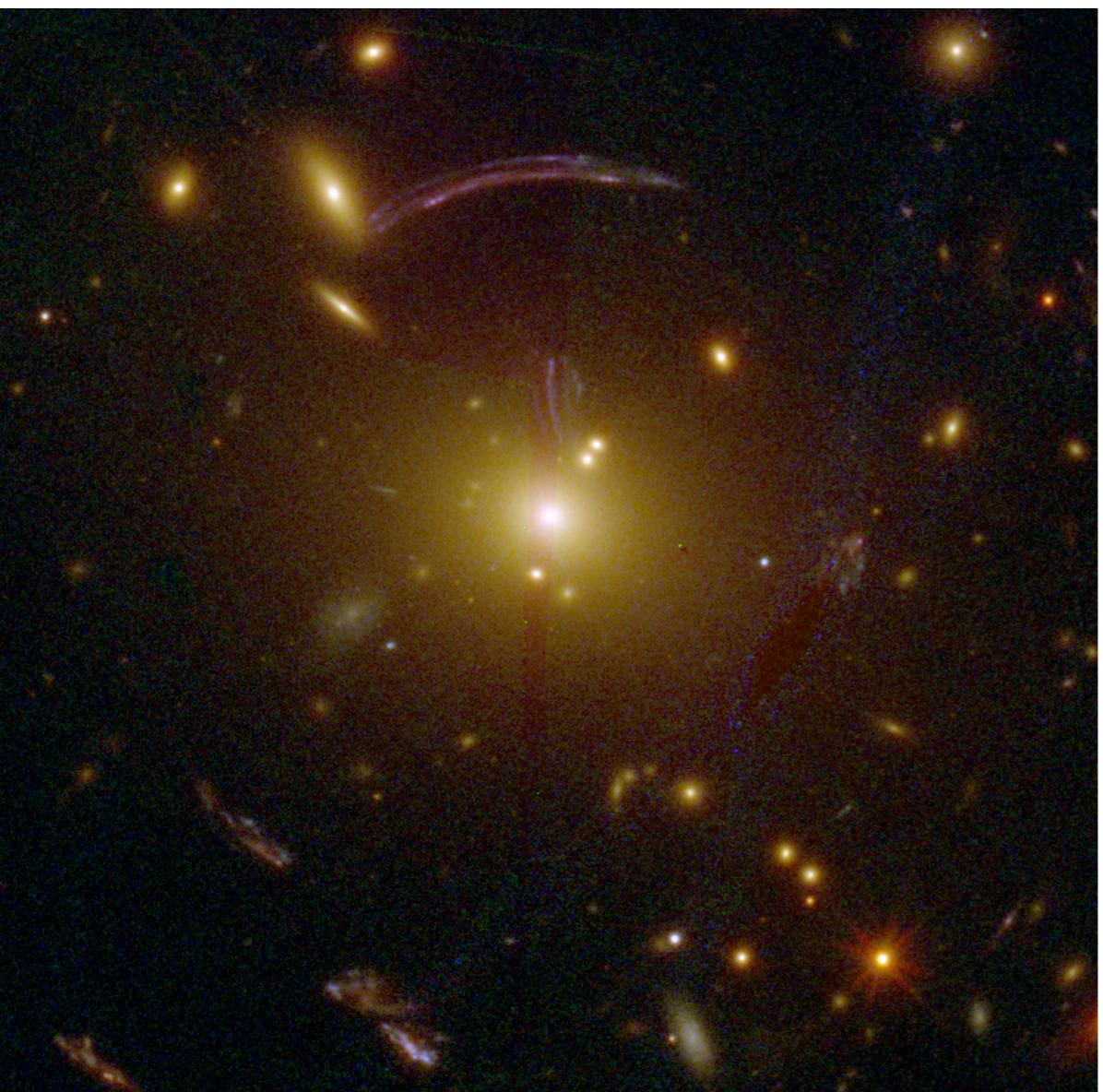


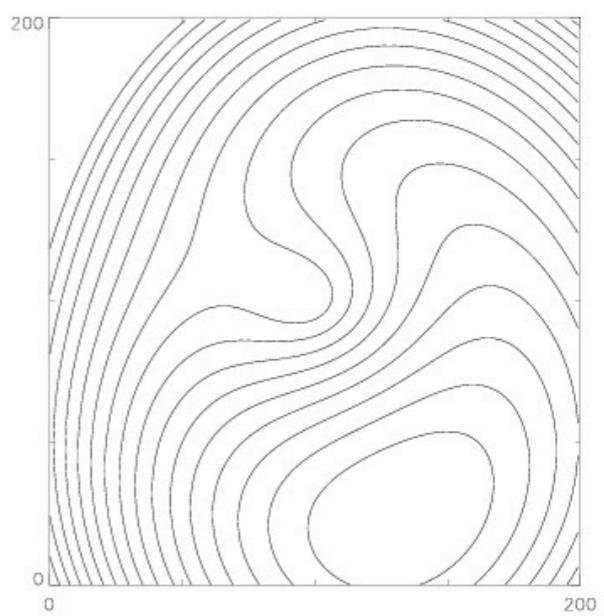
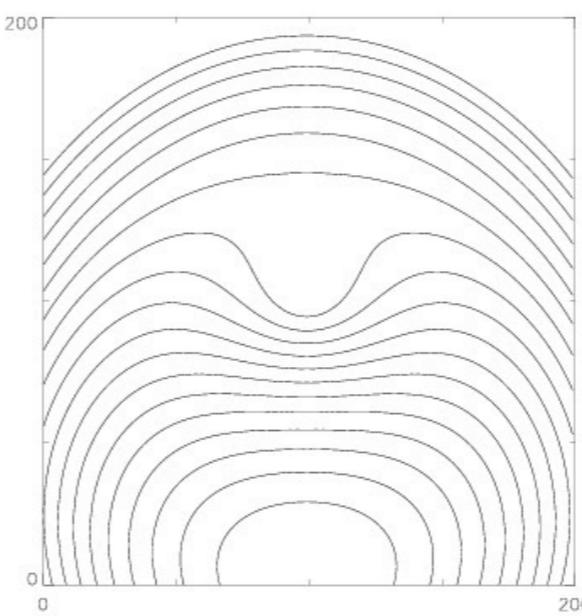
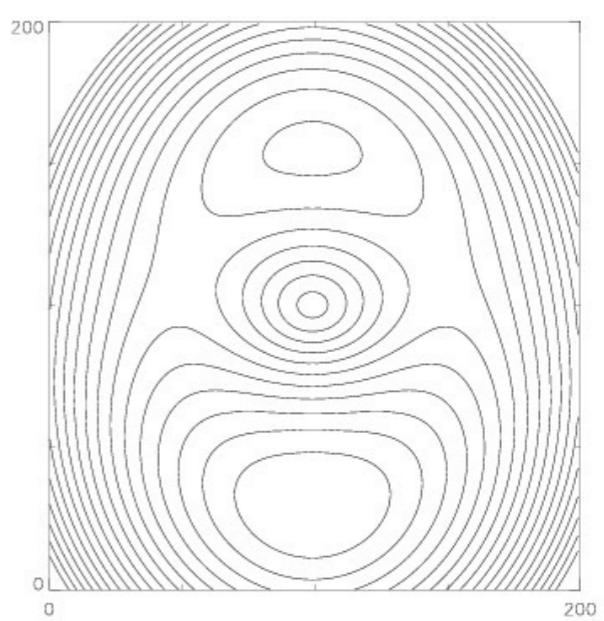
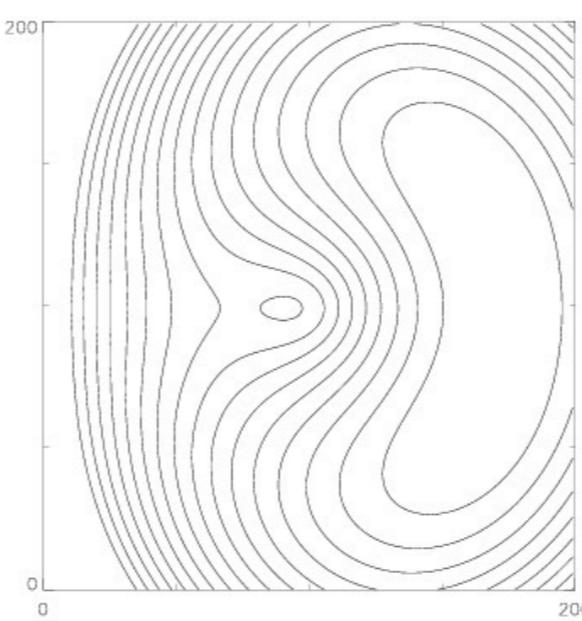
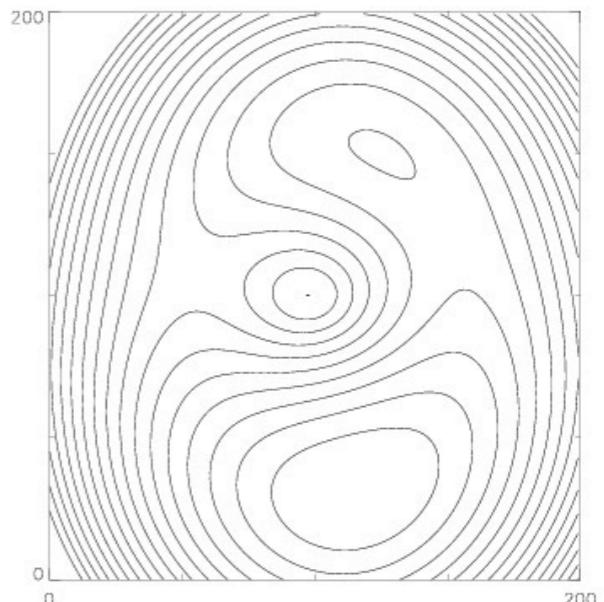
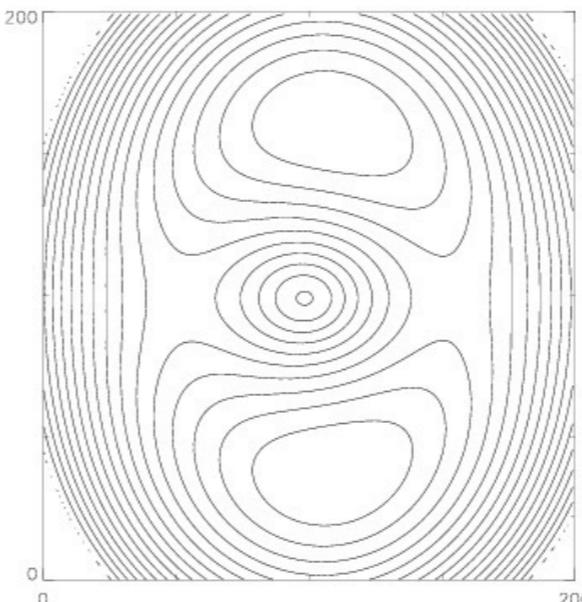
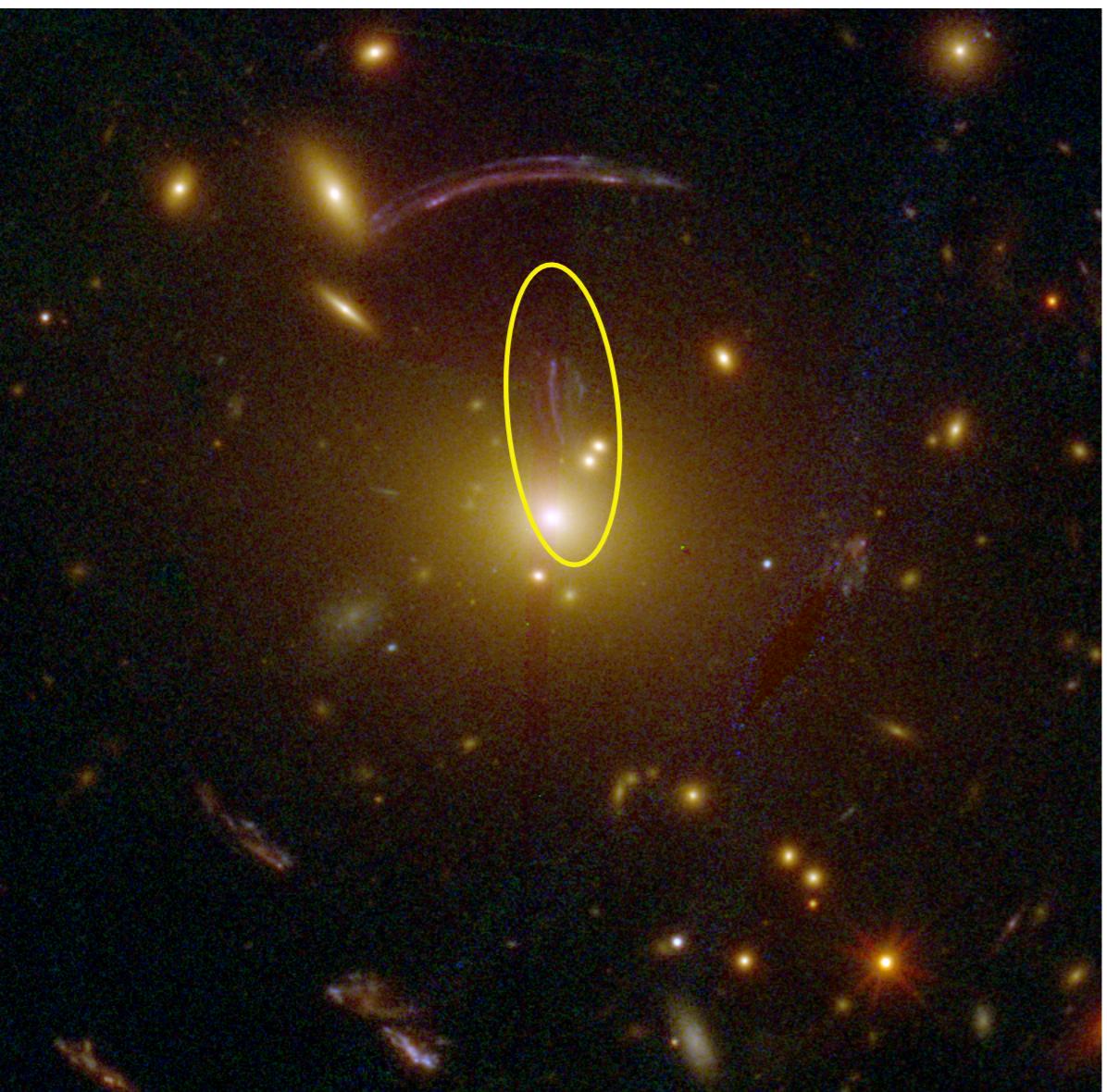


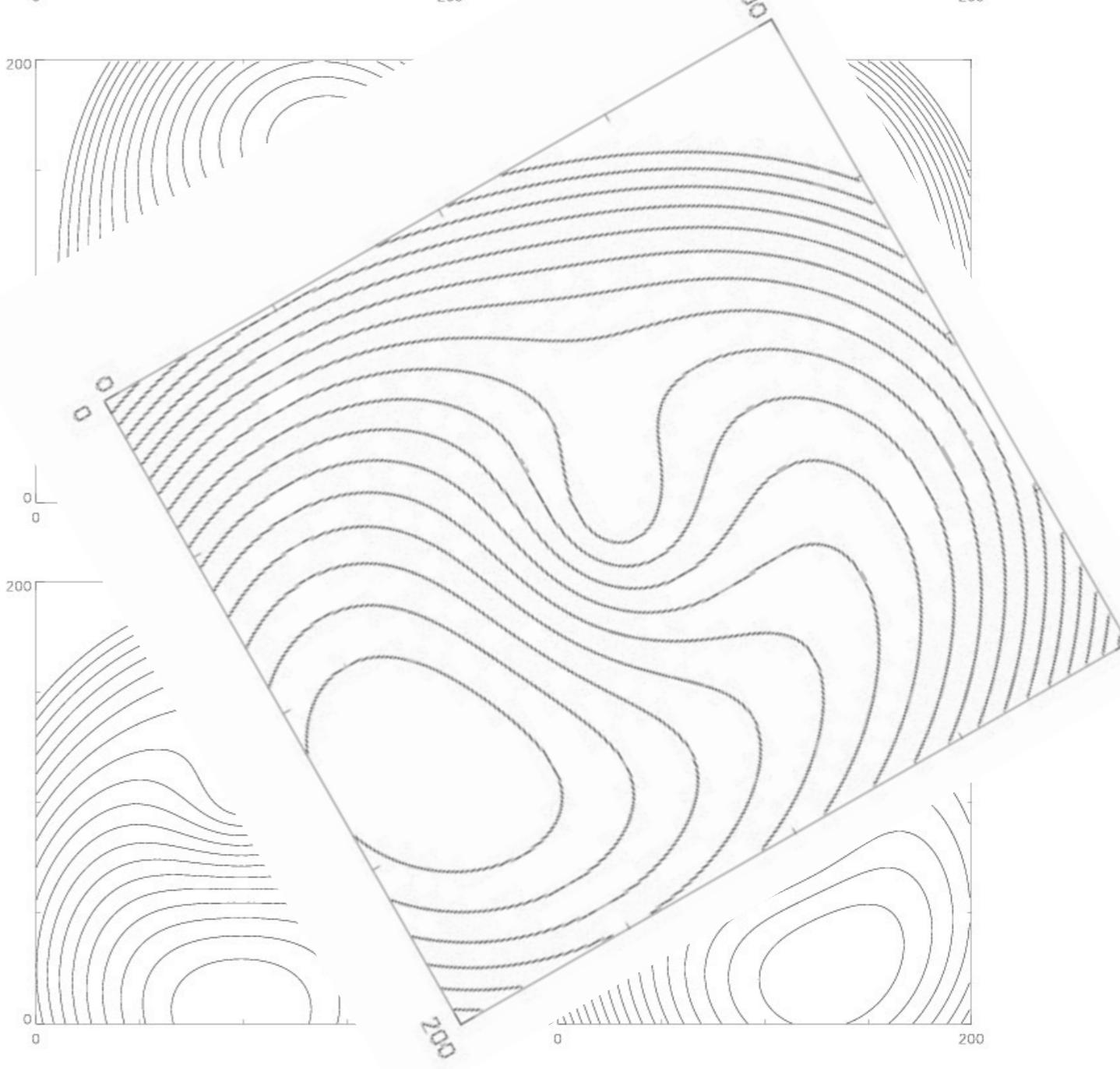
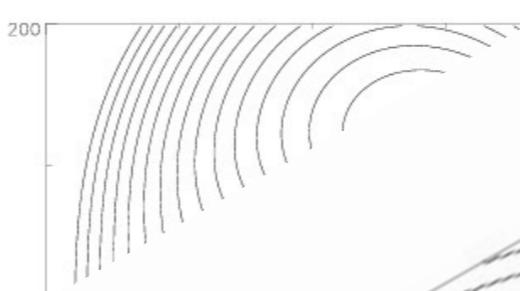
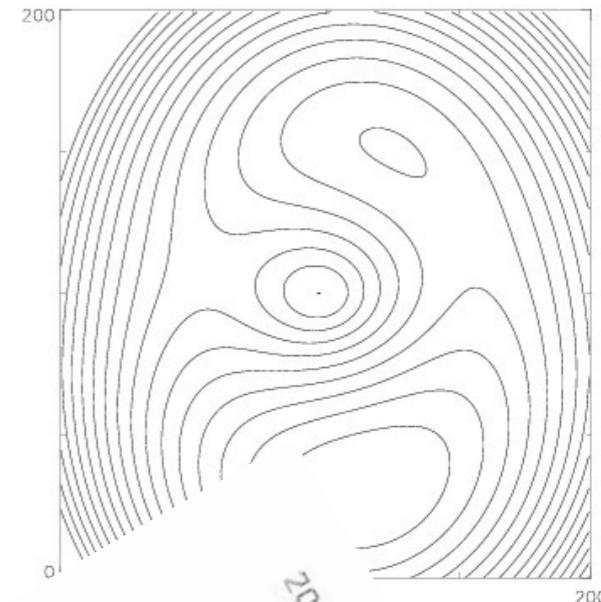
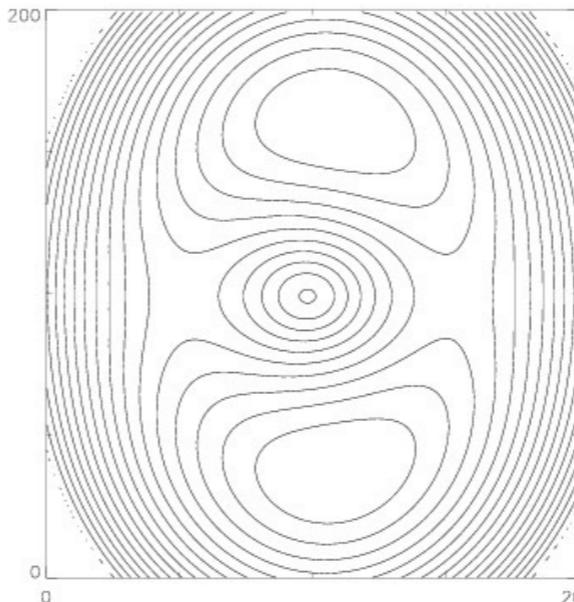
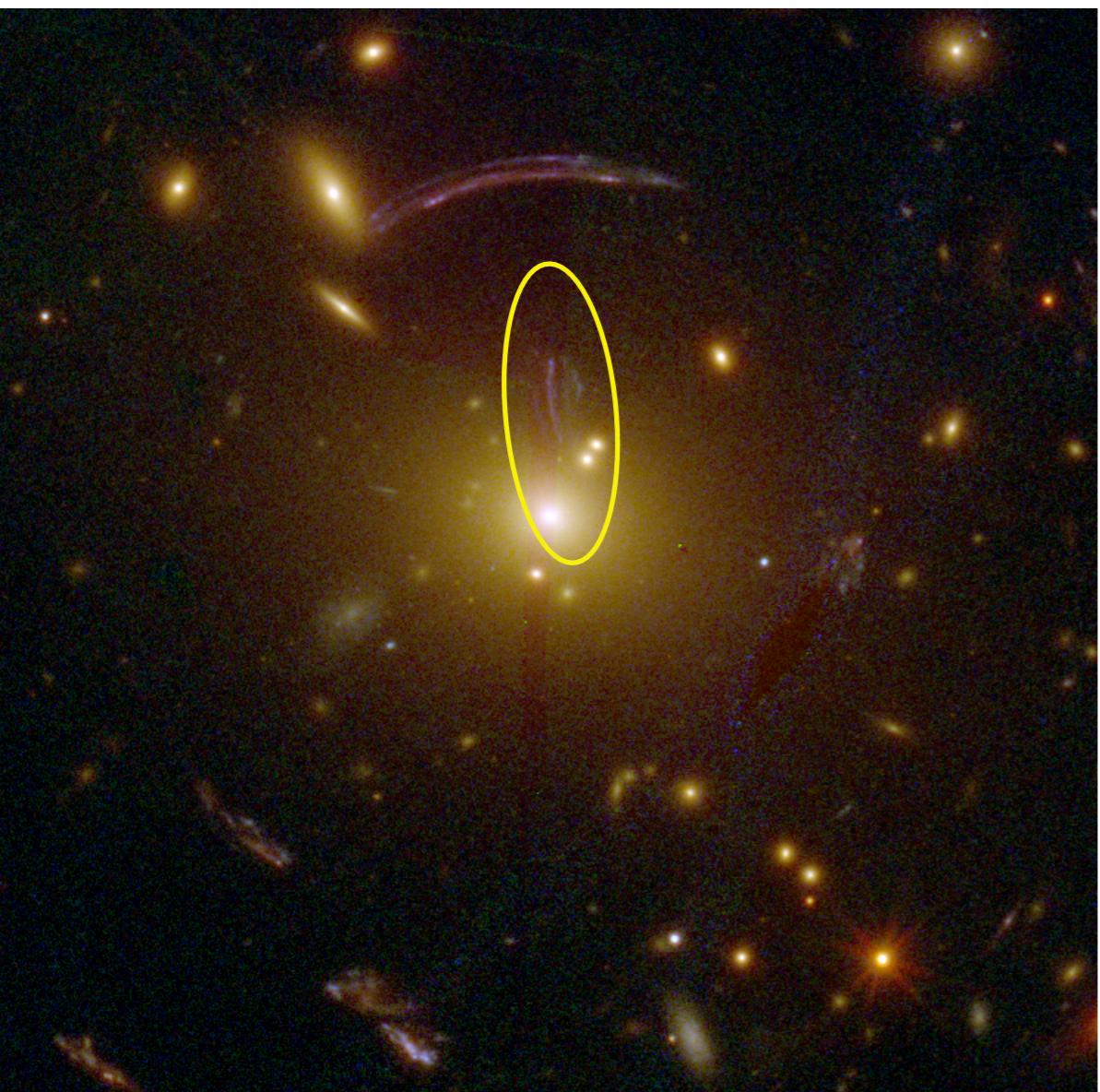


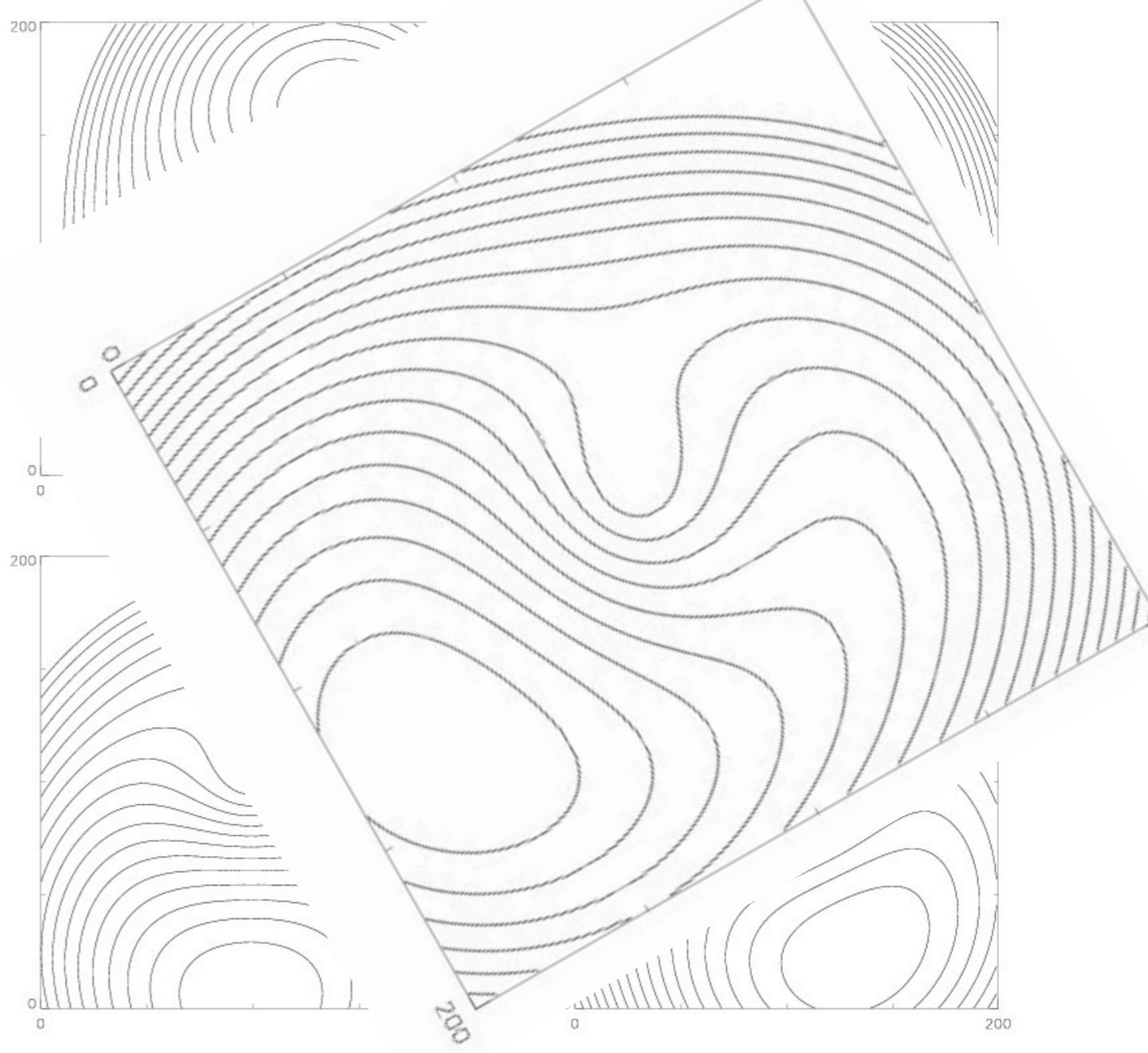
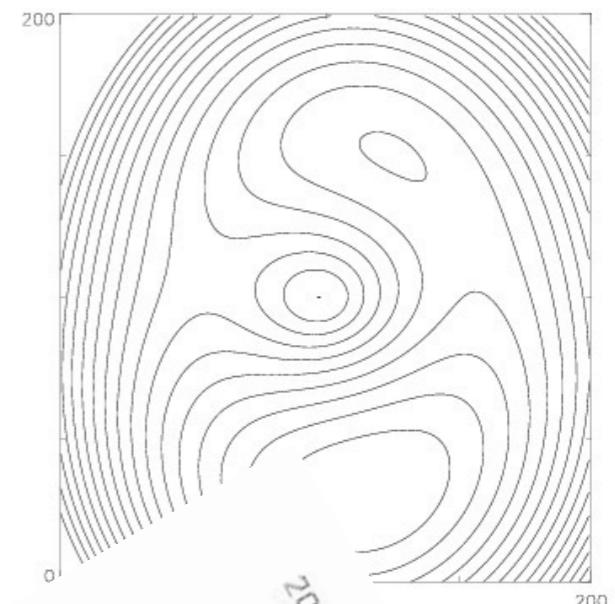
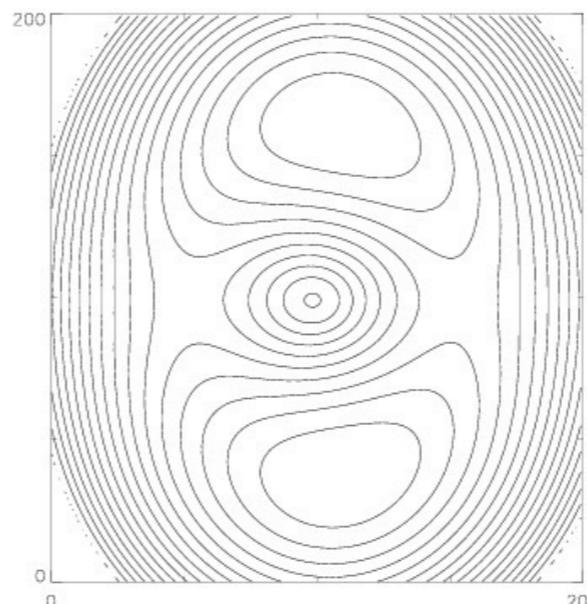
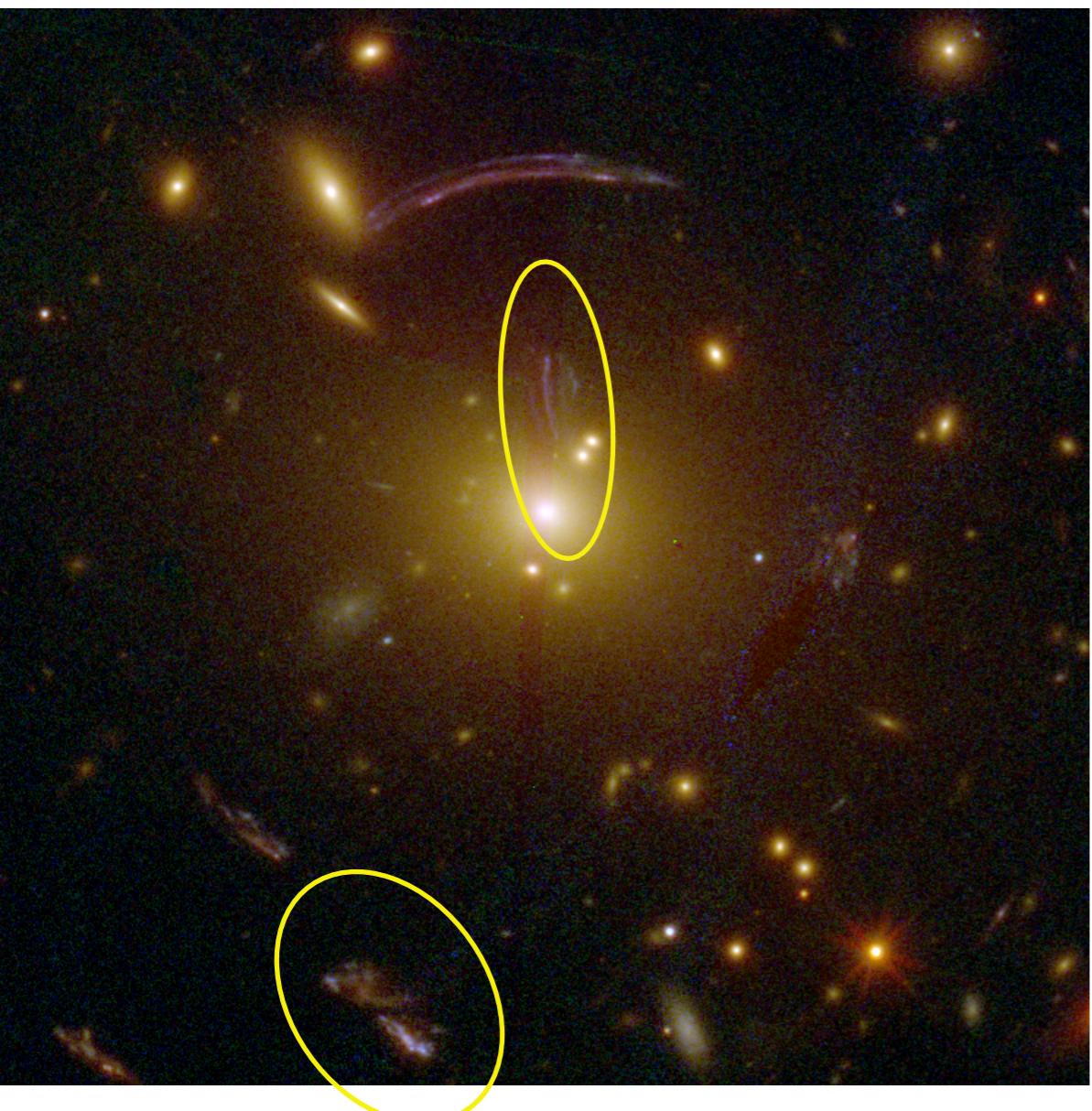




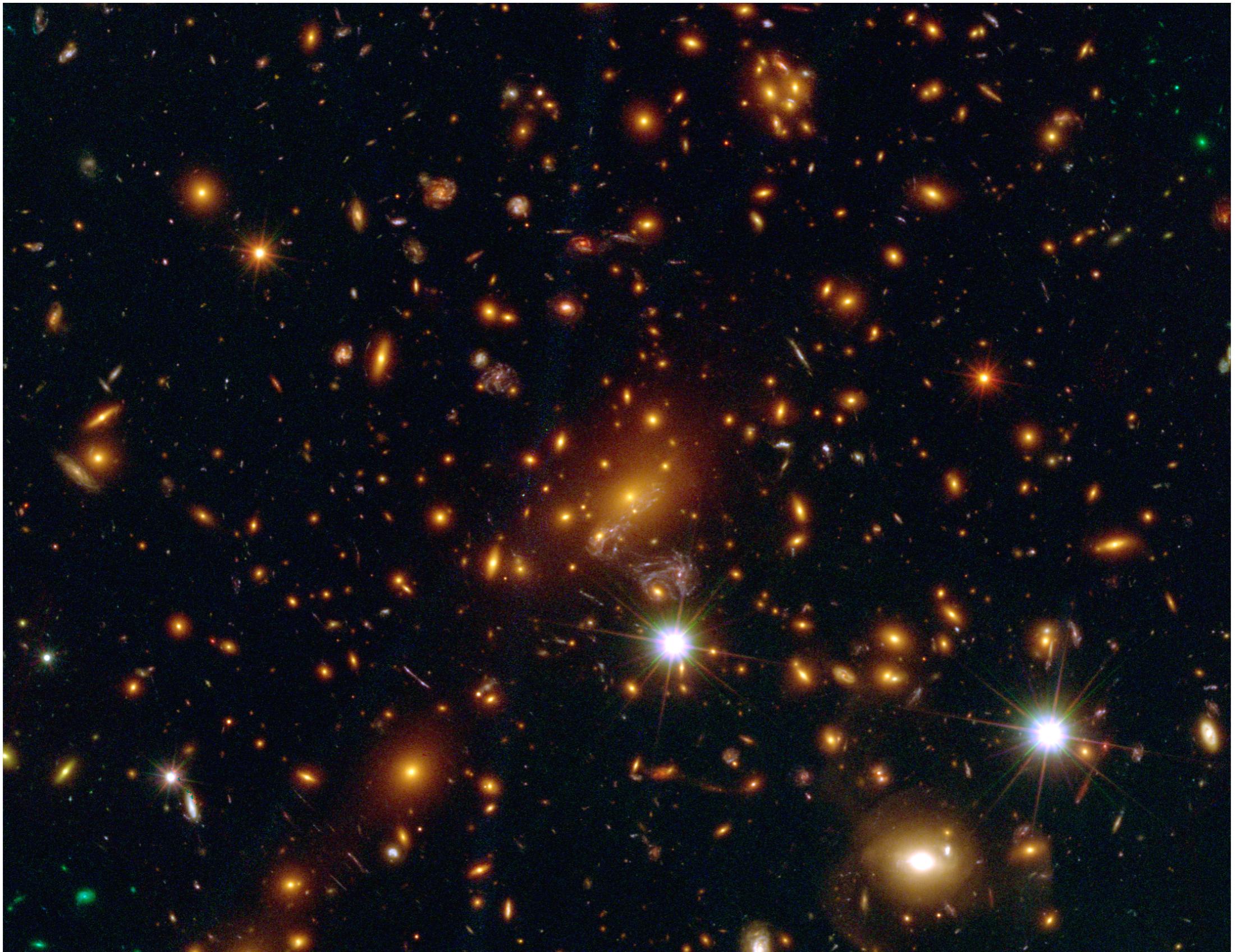




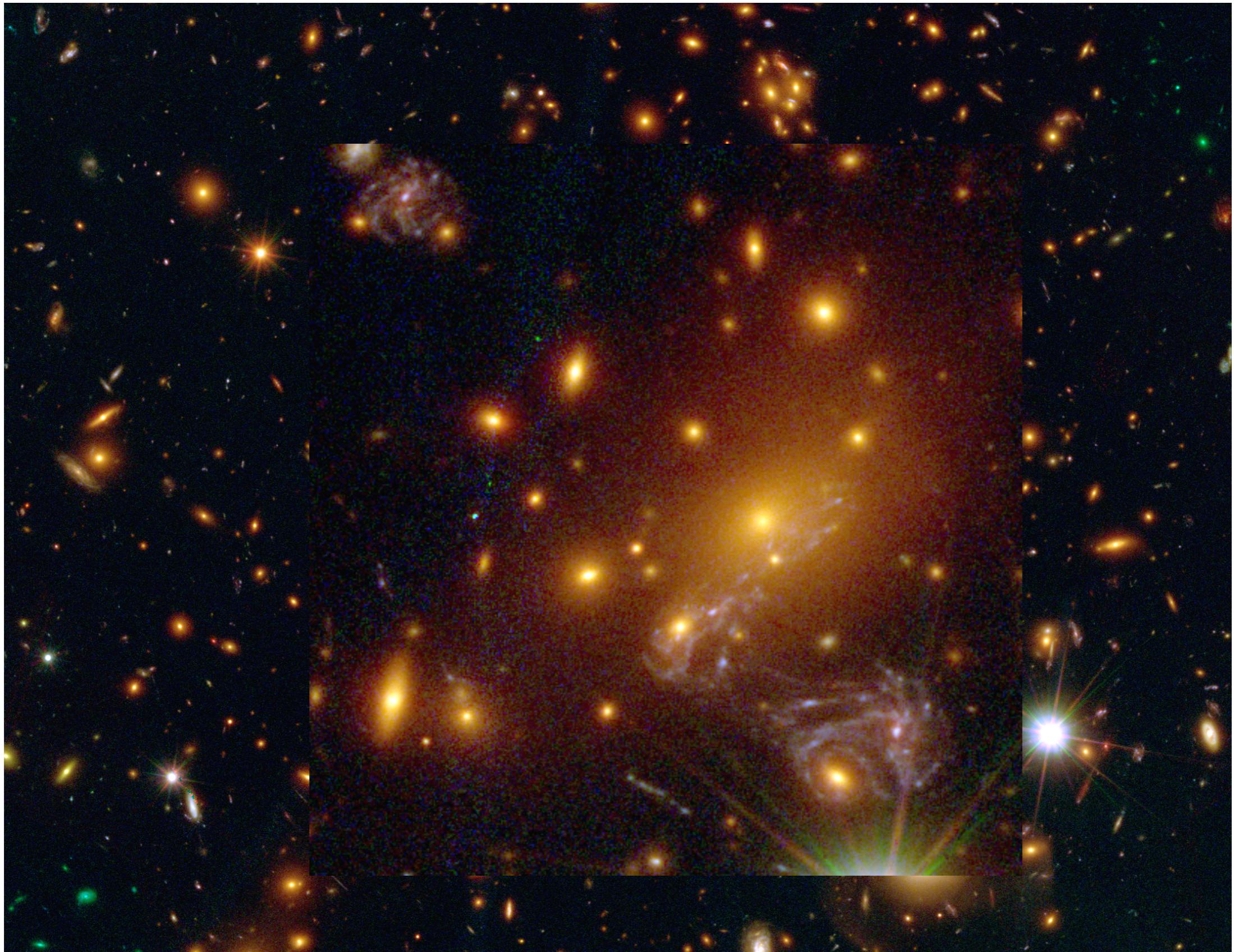




SOMETHING STRANGE HAPPENS IN MACS 1149...



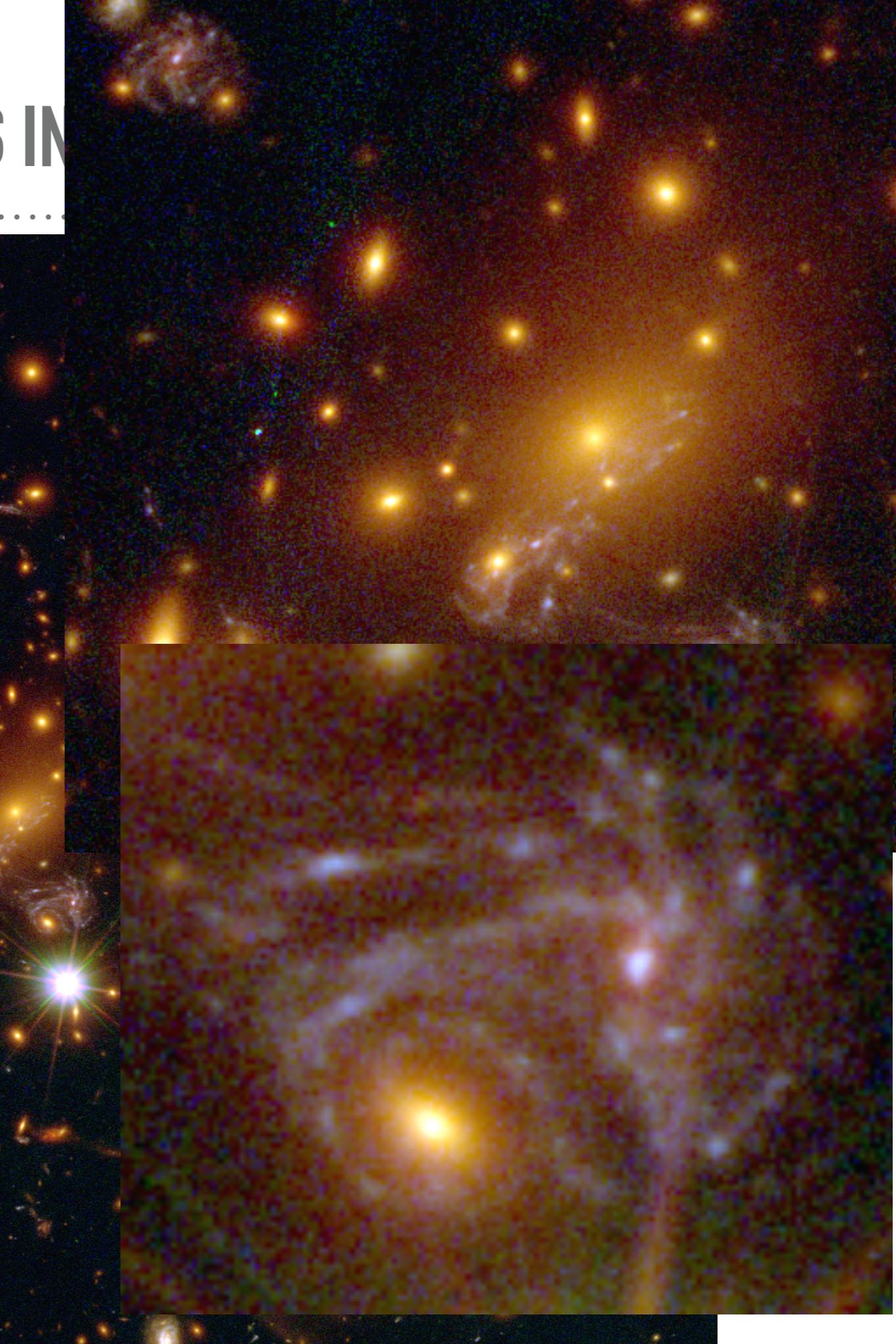
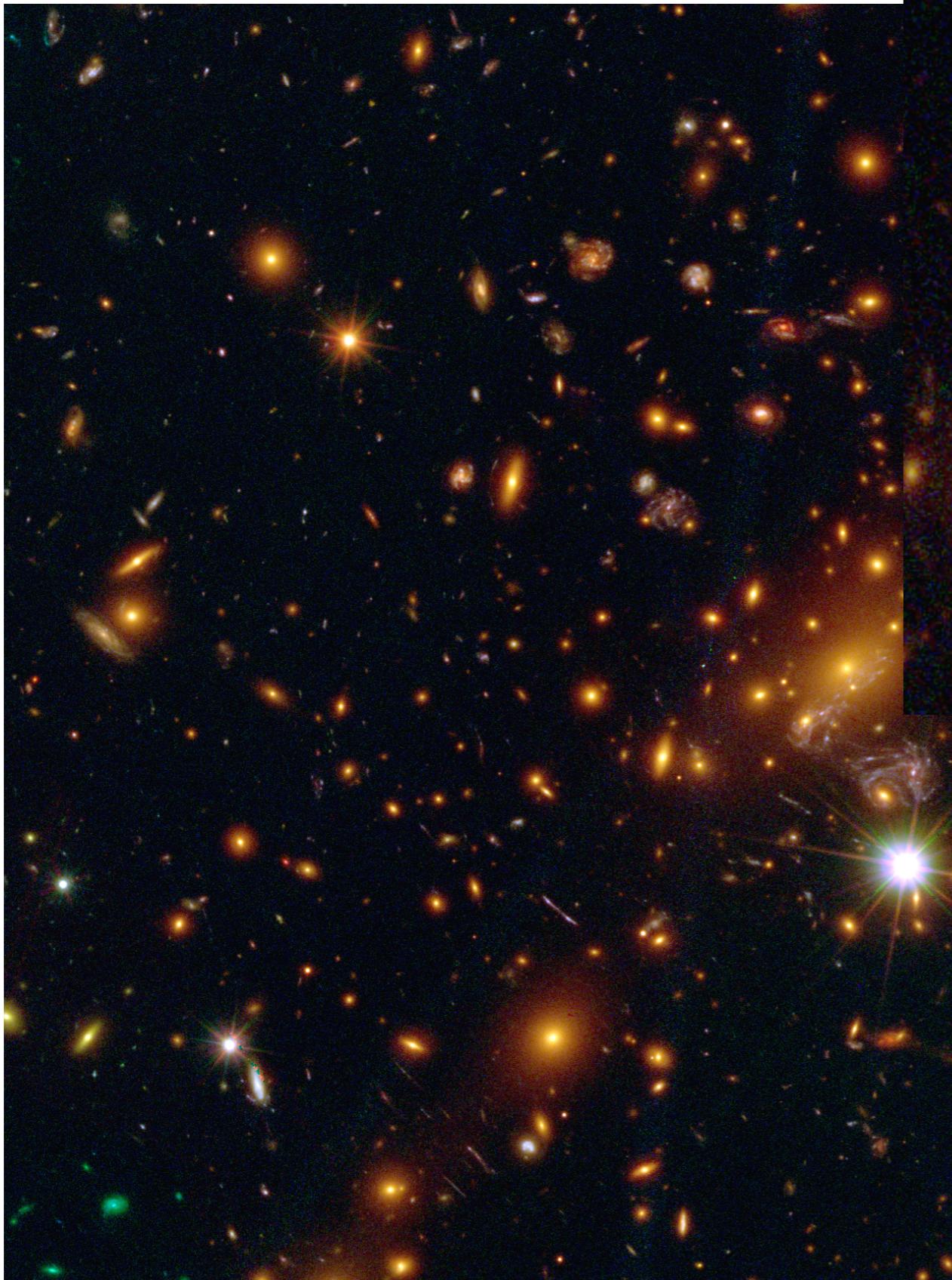
SOMETHING STRANGE HAPPENS IN MACS 1149...



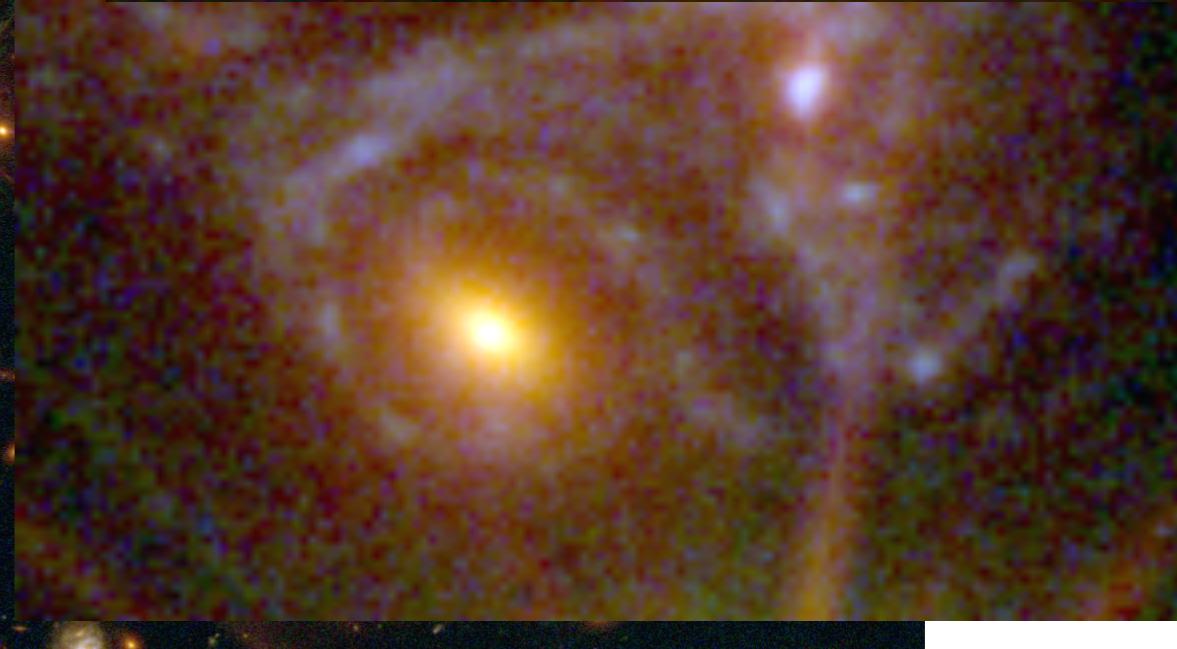
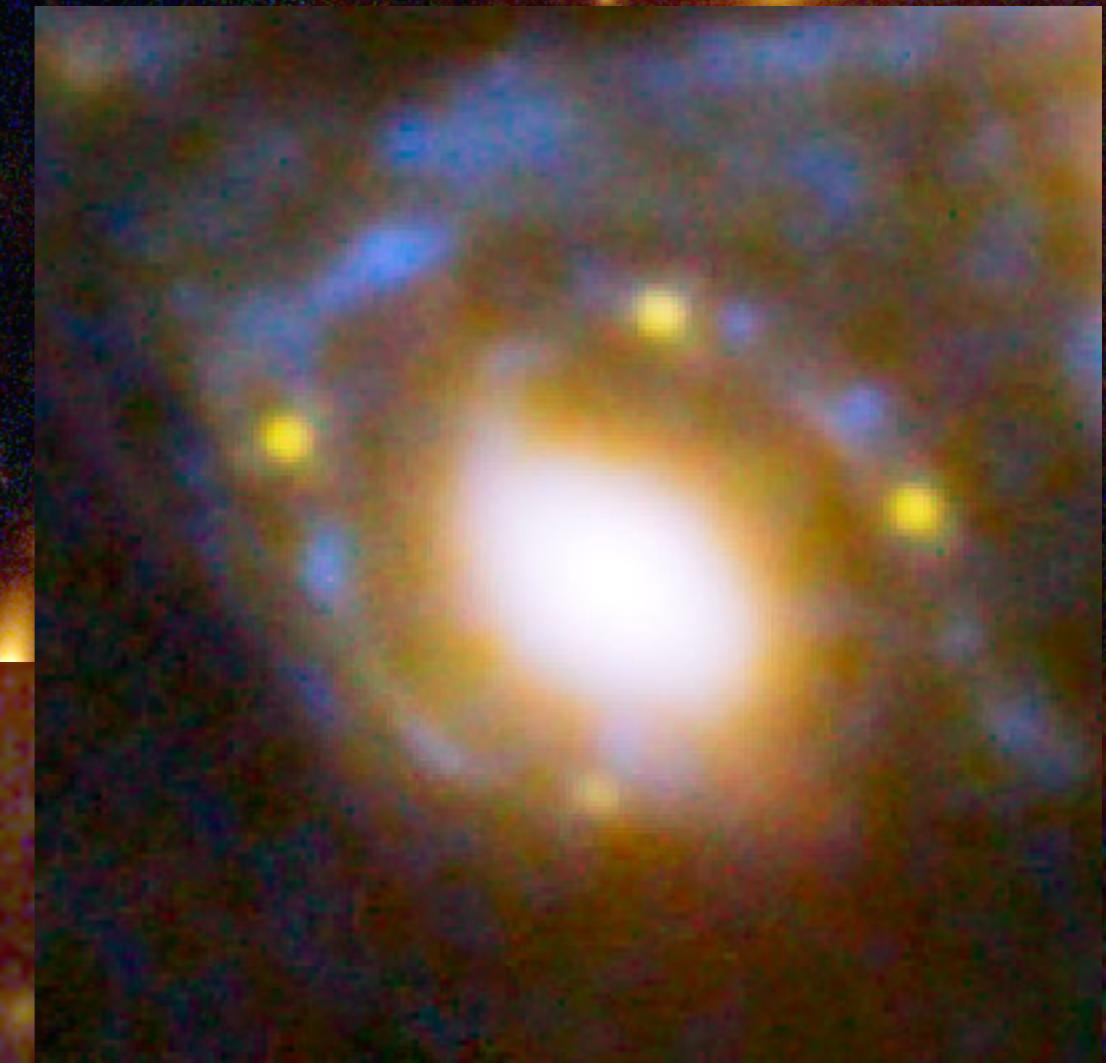
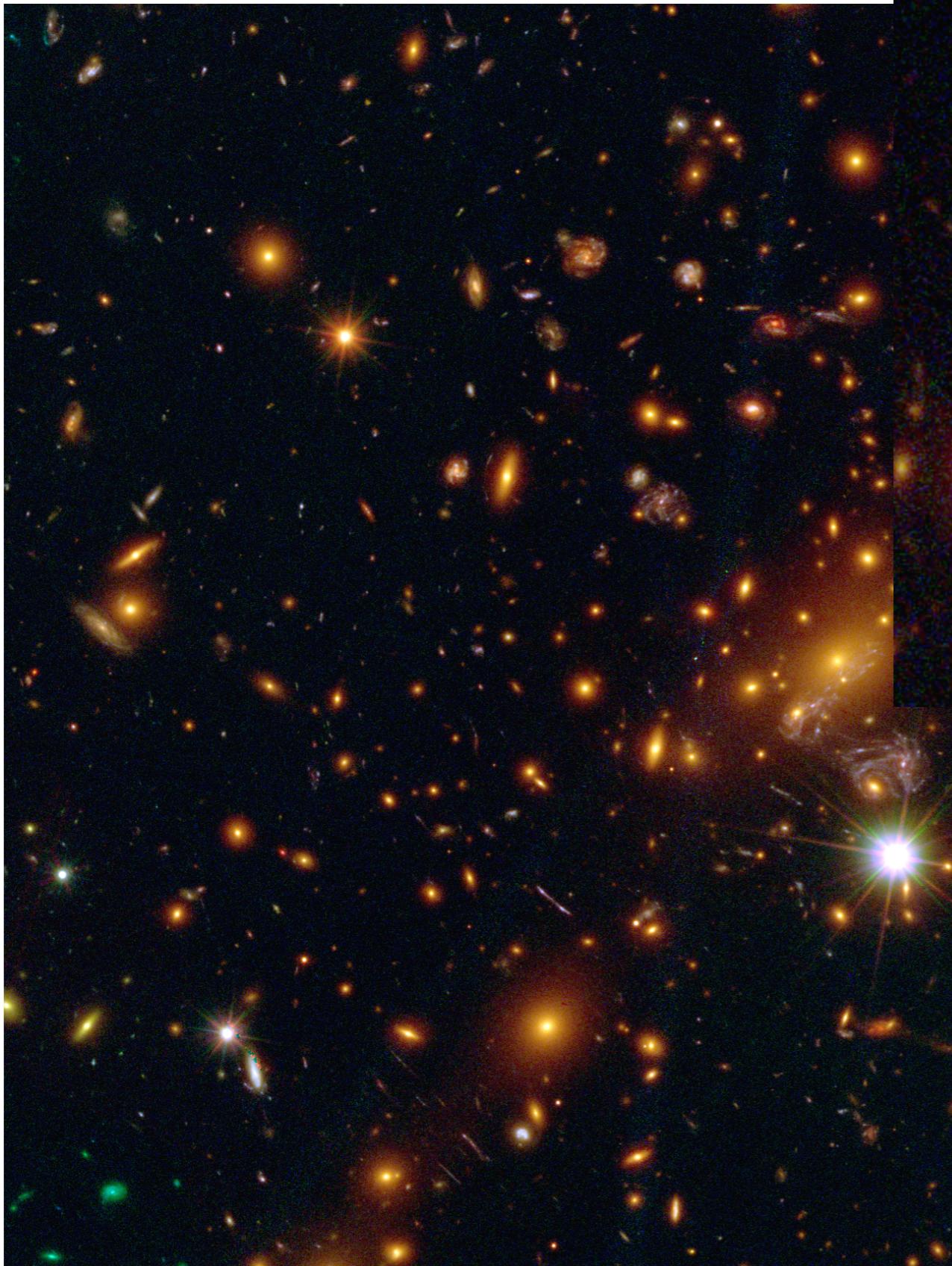
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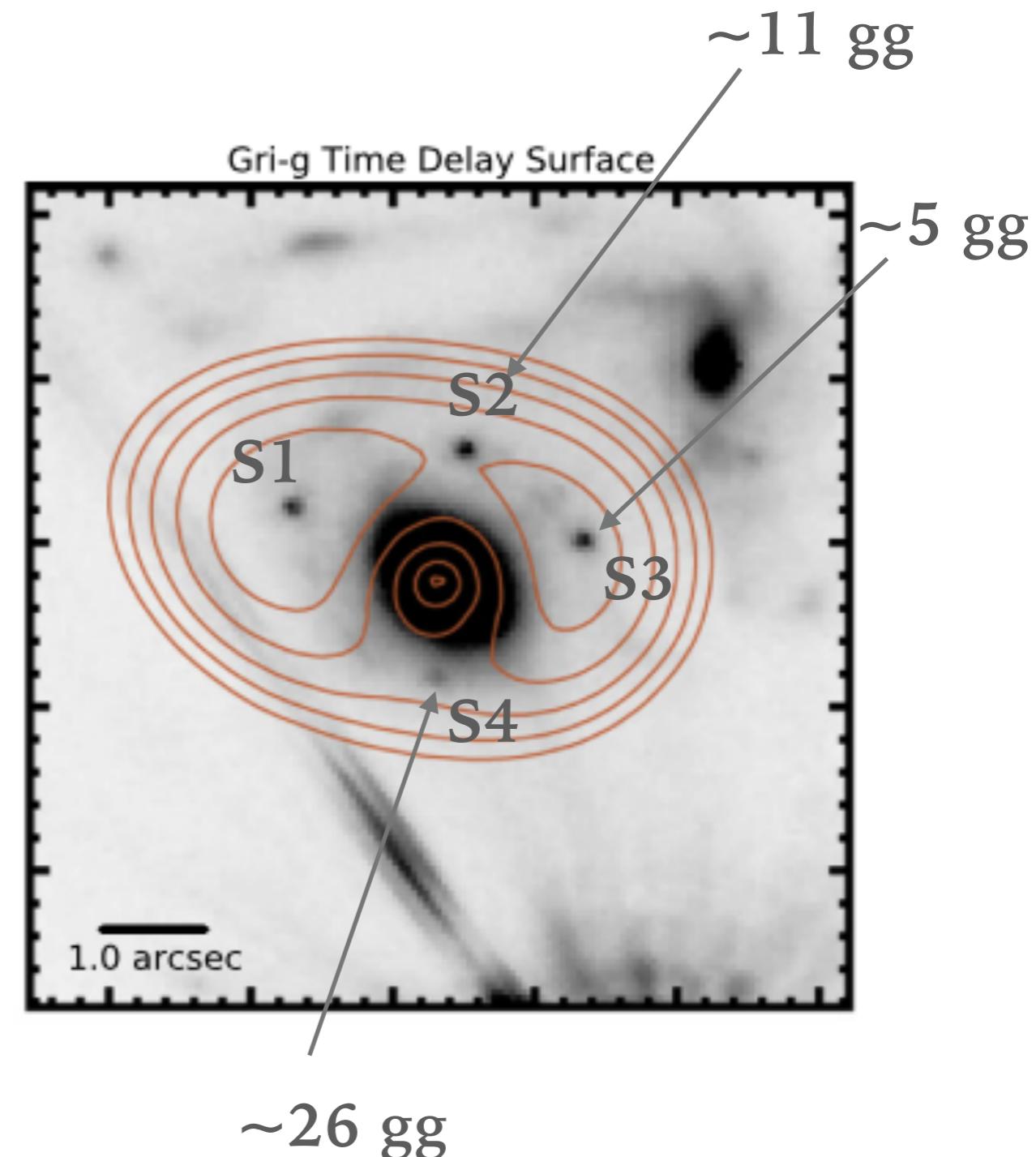
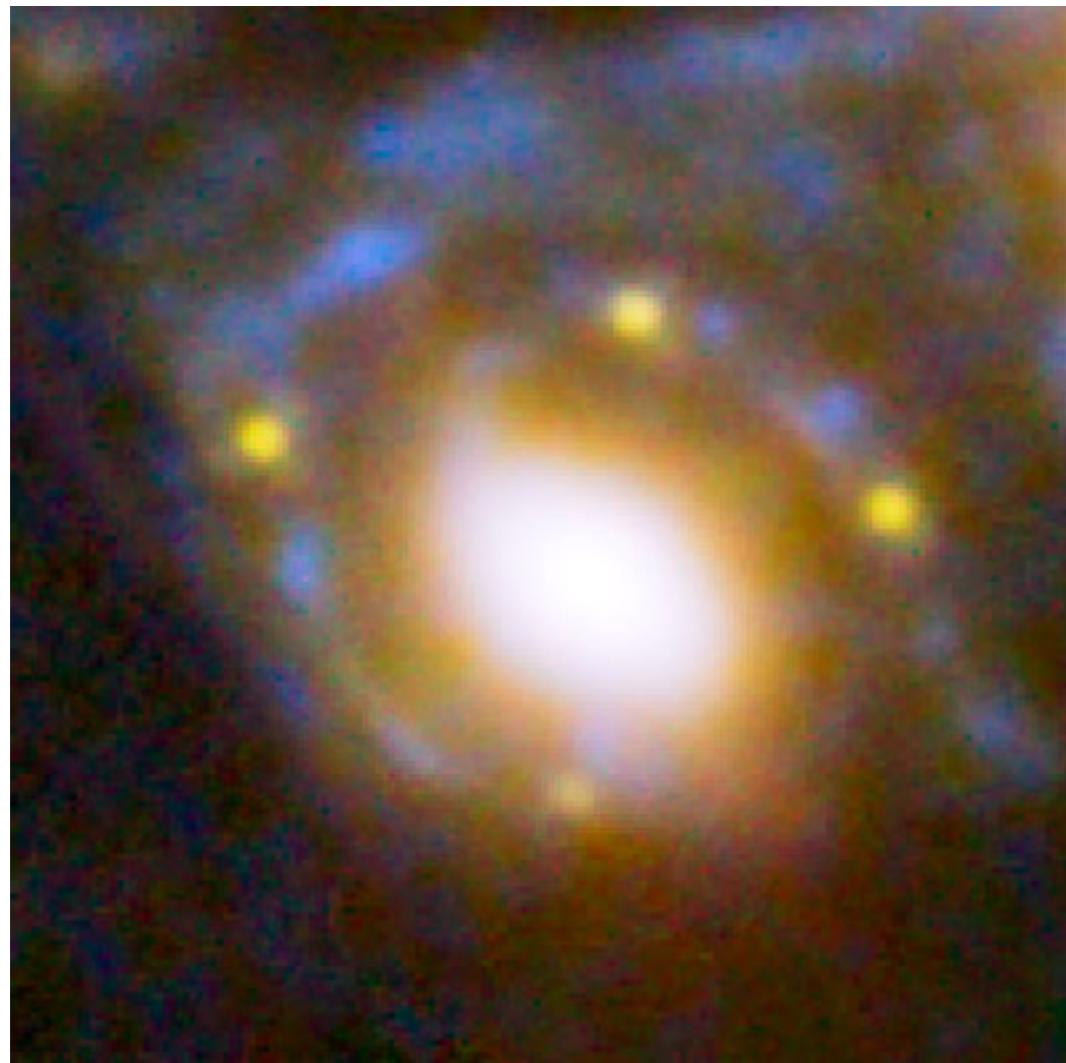


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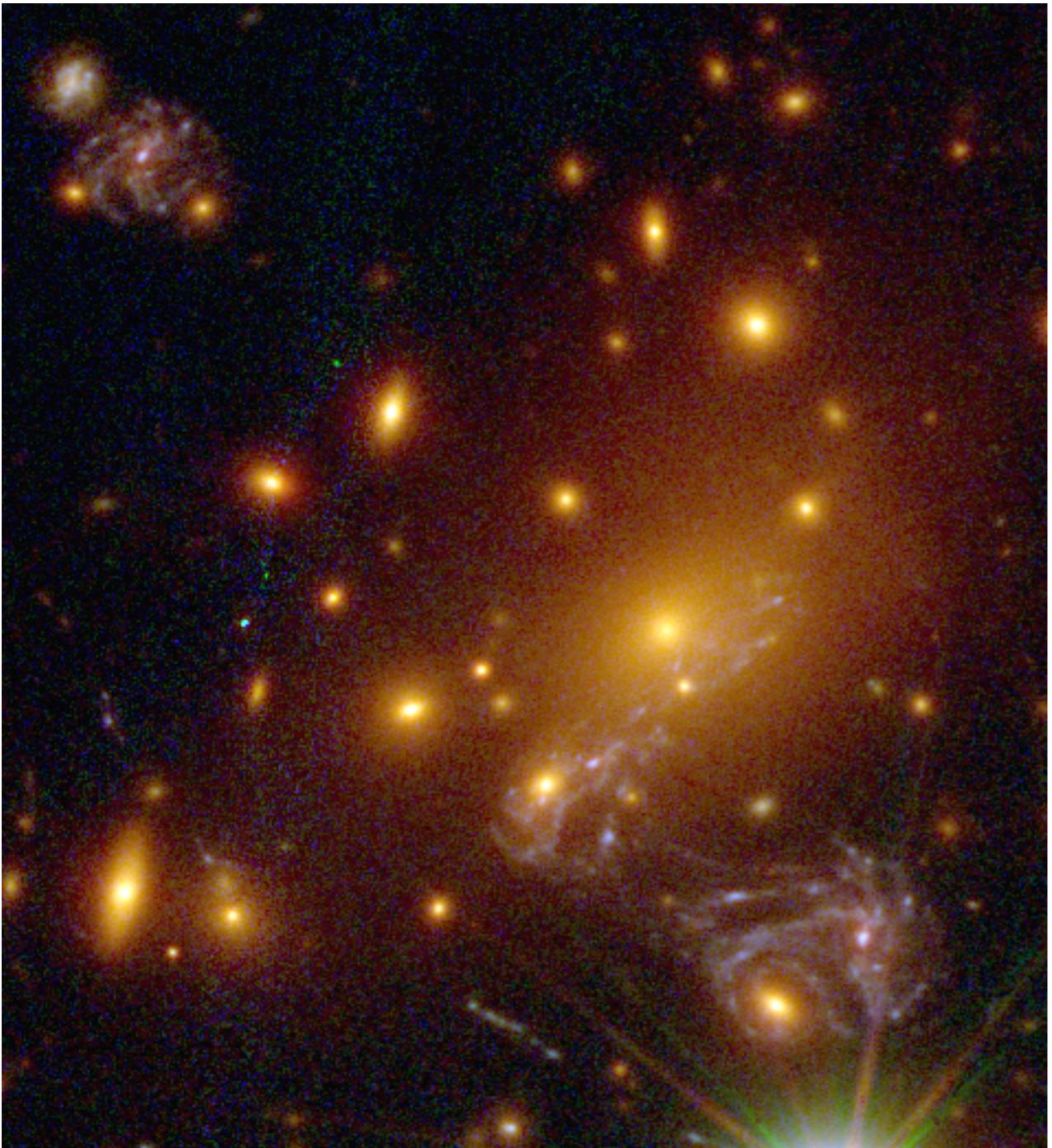
SOMETHING STRANGE HAPPENS IN MACS 1149...

Nov. 2014 (*Kelly et al.*)

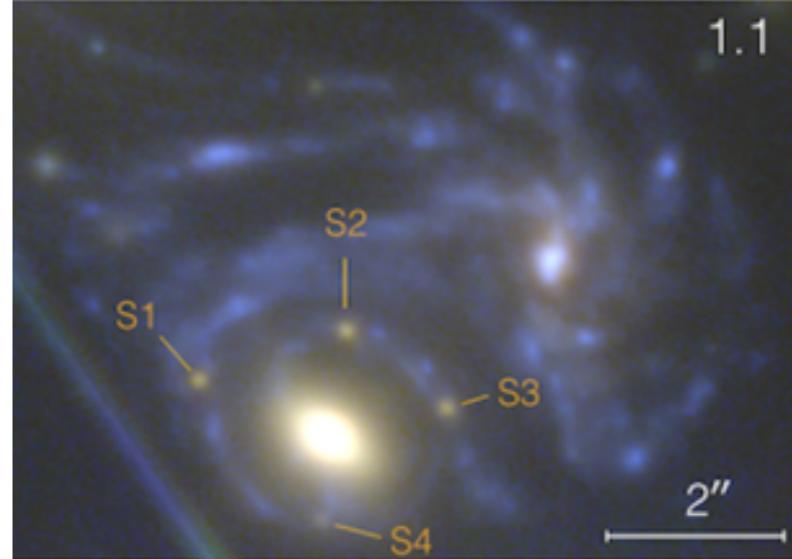
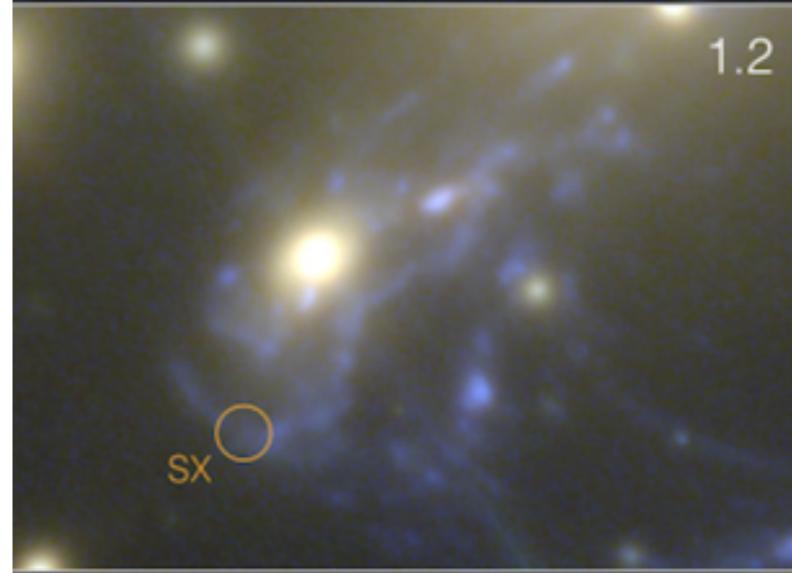
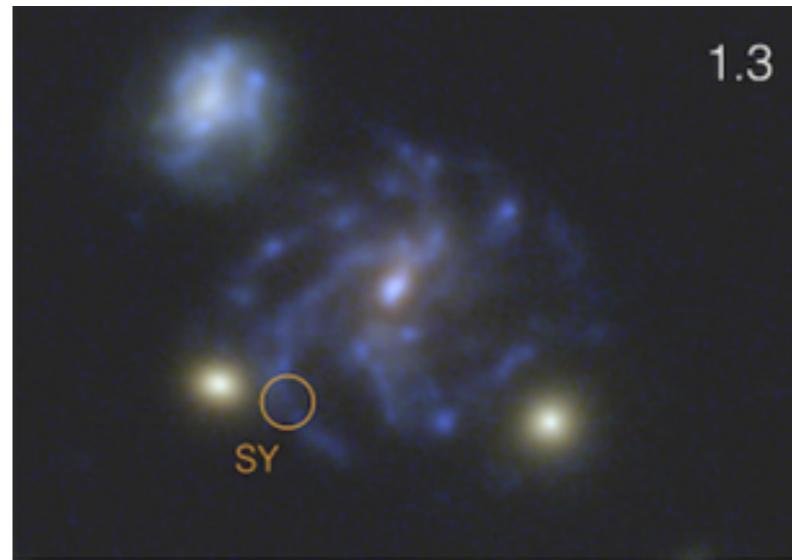
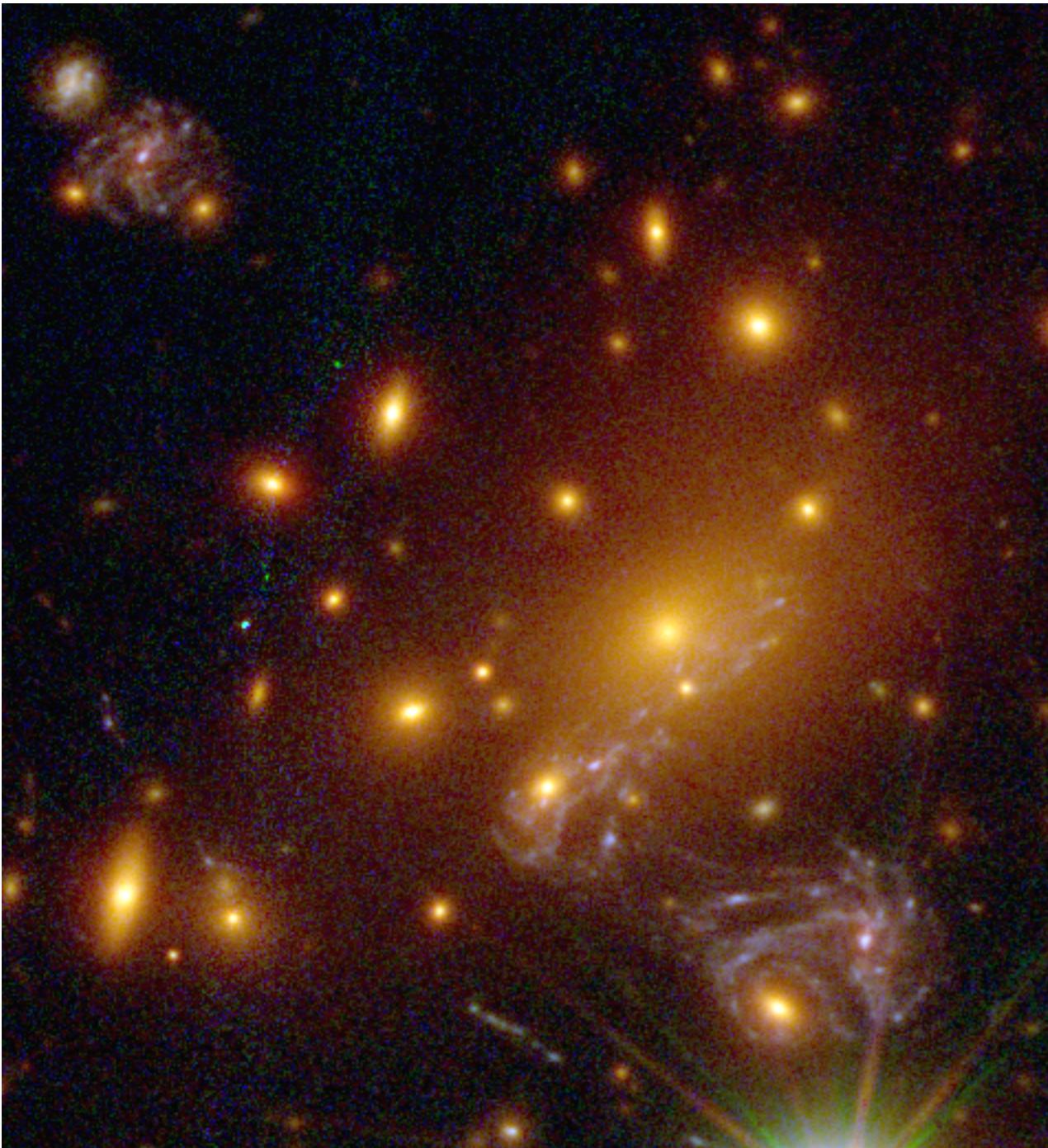


Grillo et al. 2015

SOMETHING STRANGE HAPPENS IN MACS 1149...

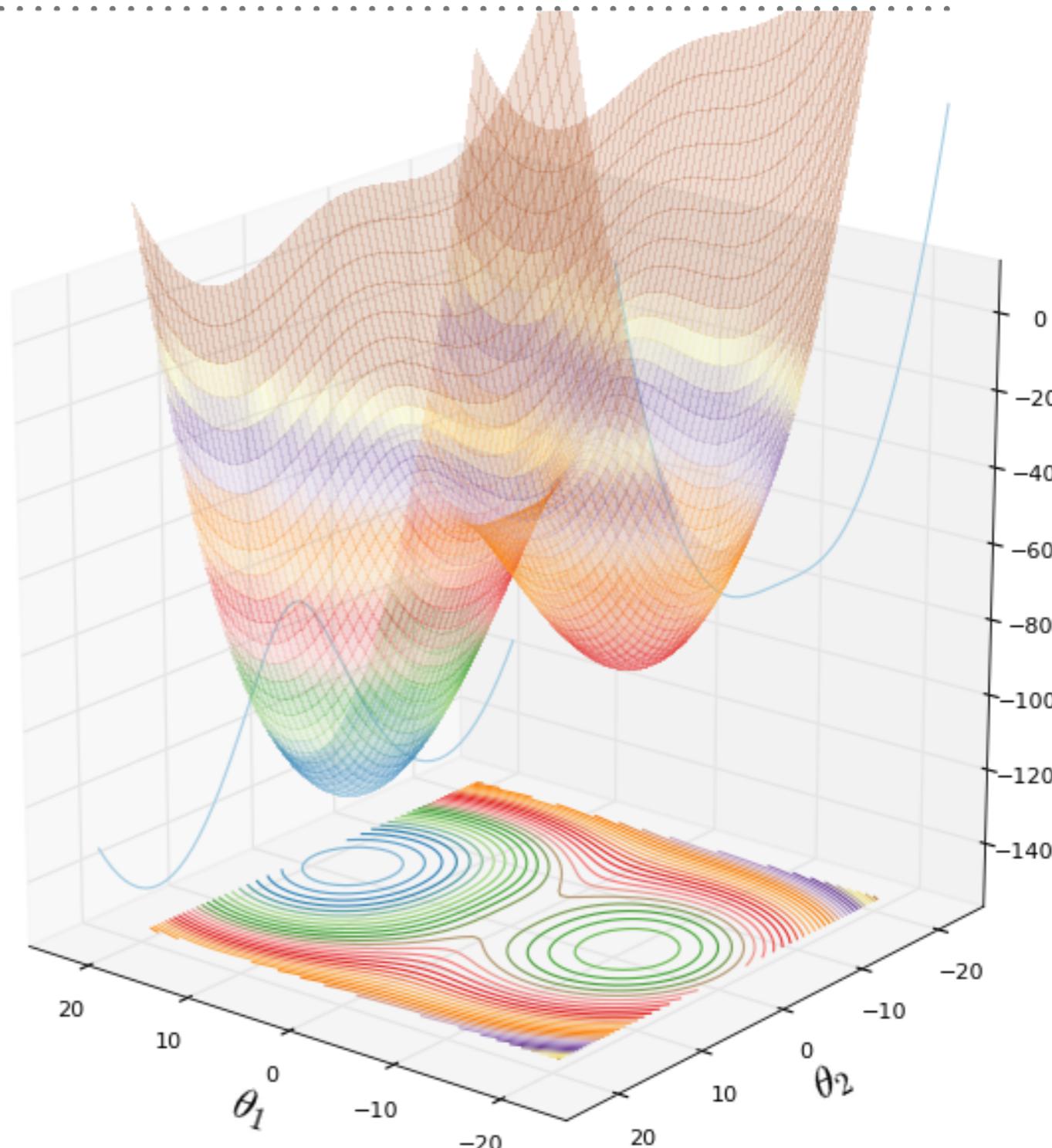


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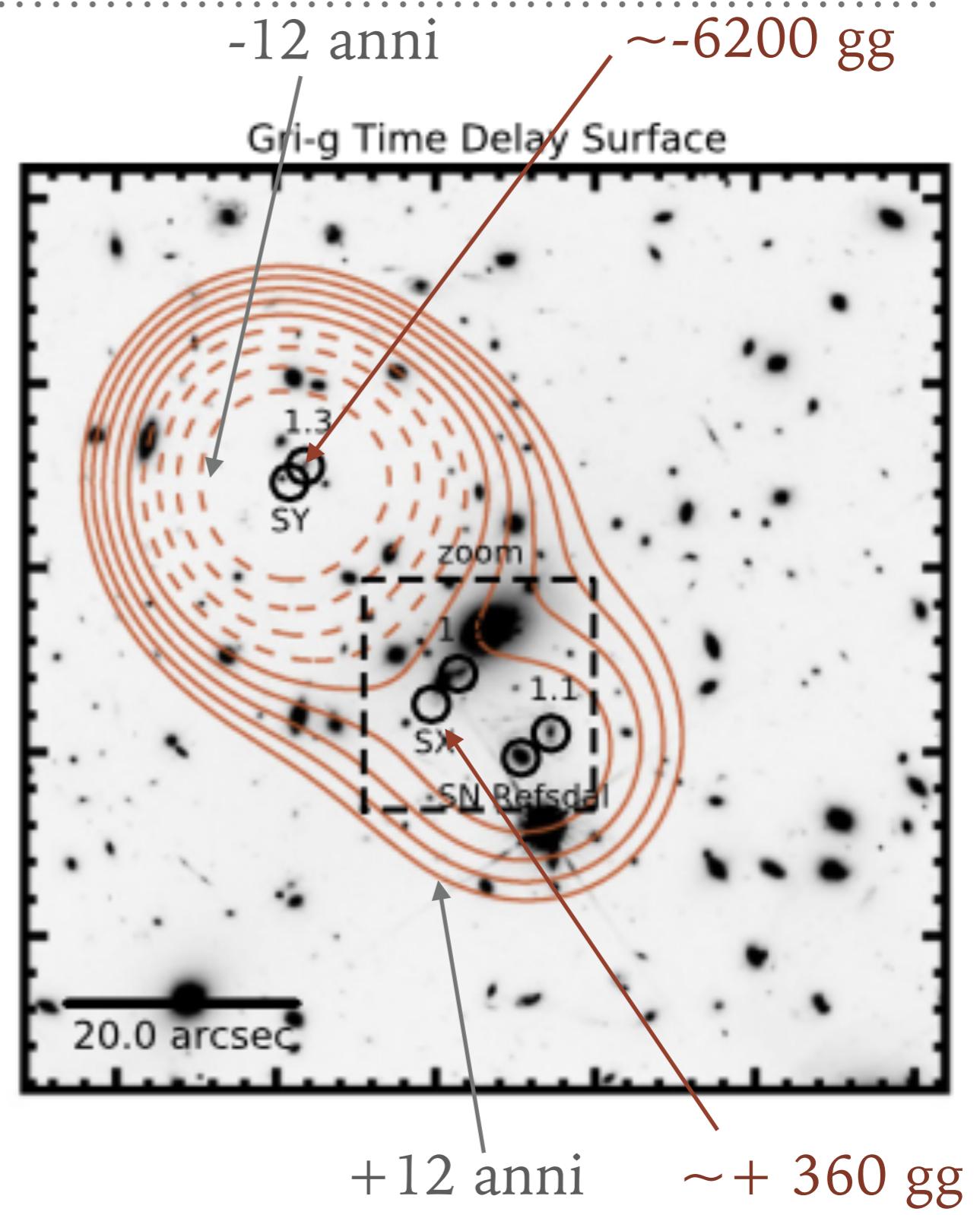


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SOMETHING STRANGE HAPPENS IN MACS 1149...



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SOMETHING STRANGE HAPPENS IN MACS 1149...

16/12/2016...

