

A possible close supermassive black-hole binary in a quasar with optical periodicity

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A possible close supermassive black-hole binary in a quasar with optical periodicity

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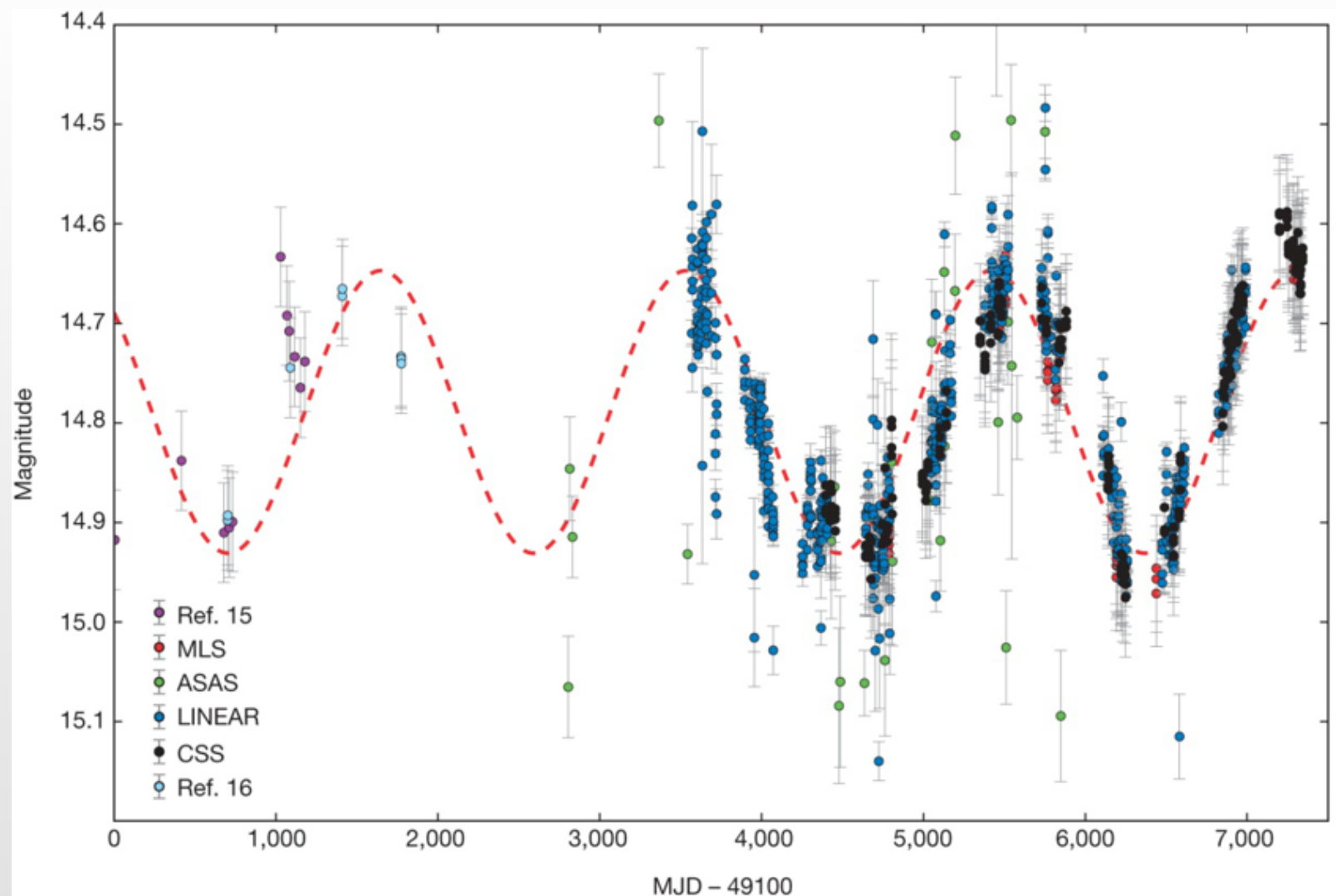
Nature **518**, 74–76 (05 February 2015) | [Download Citation](#) 

$m \sim 15 \text{ mag}$

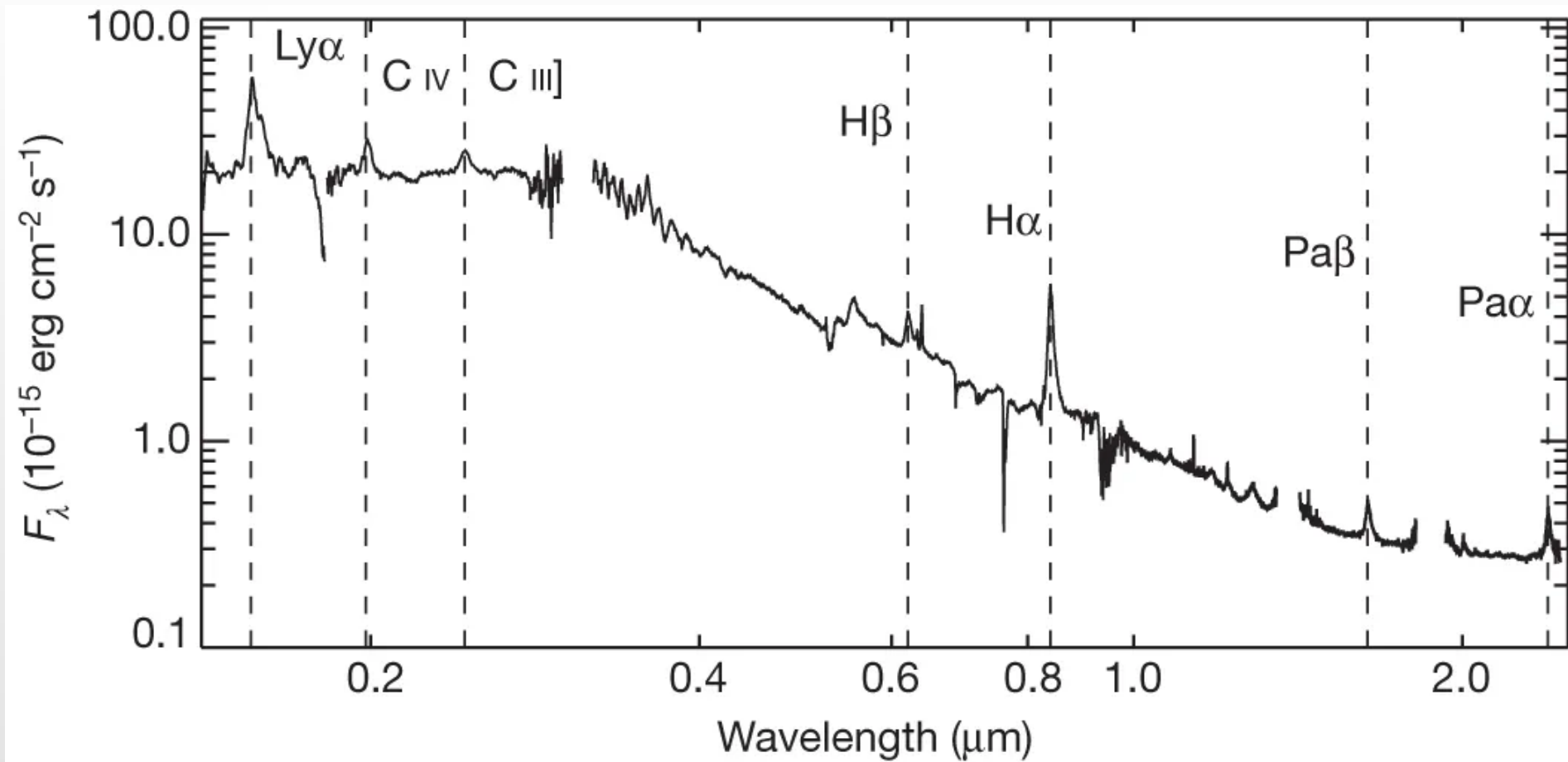
$M \sim -25.81 \text{ mag}$

$\log(L/L_{\text{Edd}}) = 0$

Period: $(1,884 \pm 88) \text{ days}$



PG1302-102在光学v波段的光变曲线

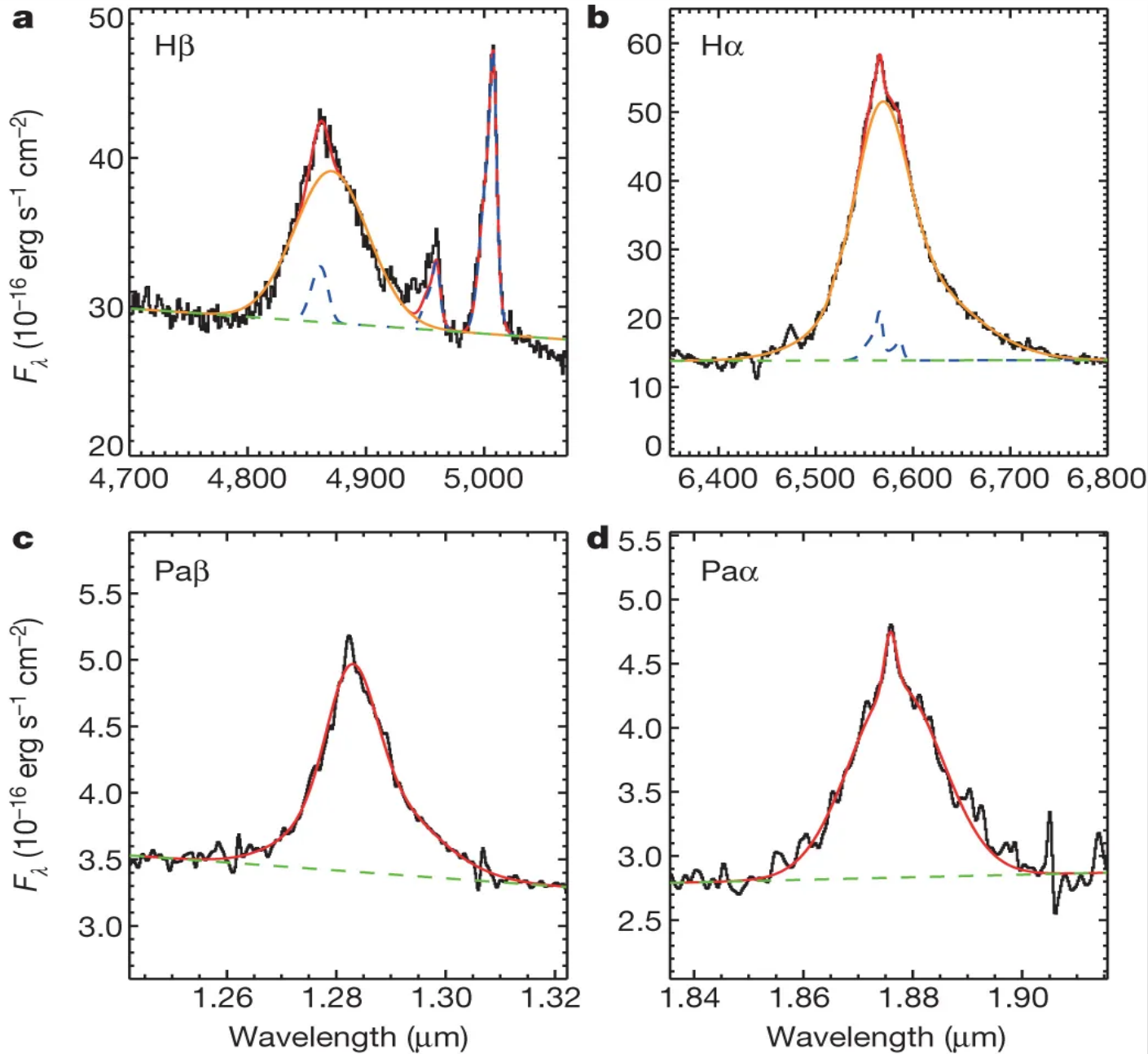


Optical/near-infrared spectrum

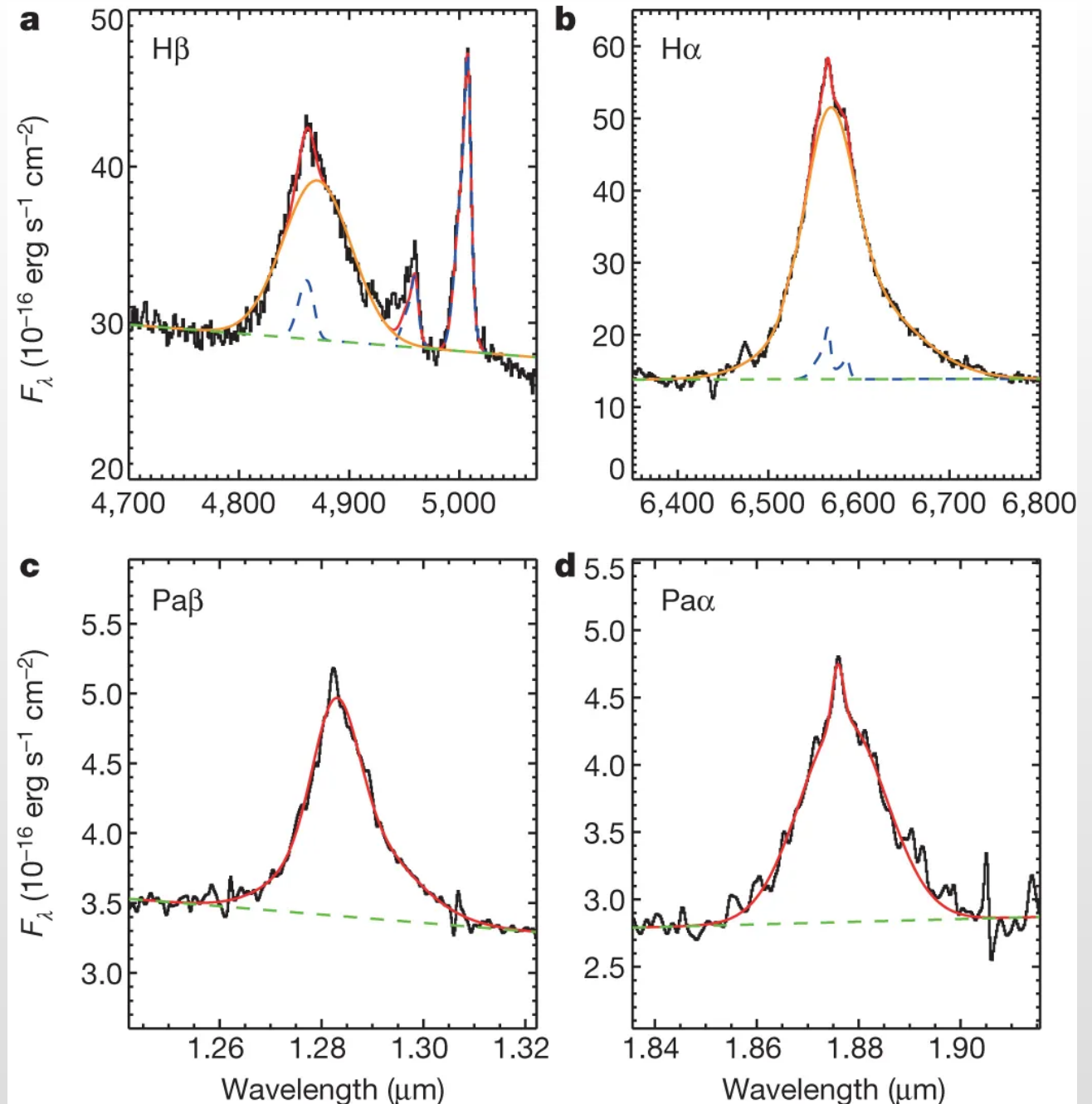
$\log(M/M_{\odot}) = 8.3\text{--}9.4$

a narrow component--blue line
a broad Gaussian--orange line
linear continuum component--green line
total fitted profile--red line

H β requires a single Gaussian offset from the narrow component but H α requires two components—a central Gaussian plus a red wing



In particular, a small bump on the red wing of $H\beta$ has been reported²¹, implying a velocity shift of the order of 200 km s^{-1} between the narrow and broad components of $H\beta$. One proposed explanation for this is a binary system.

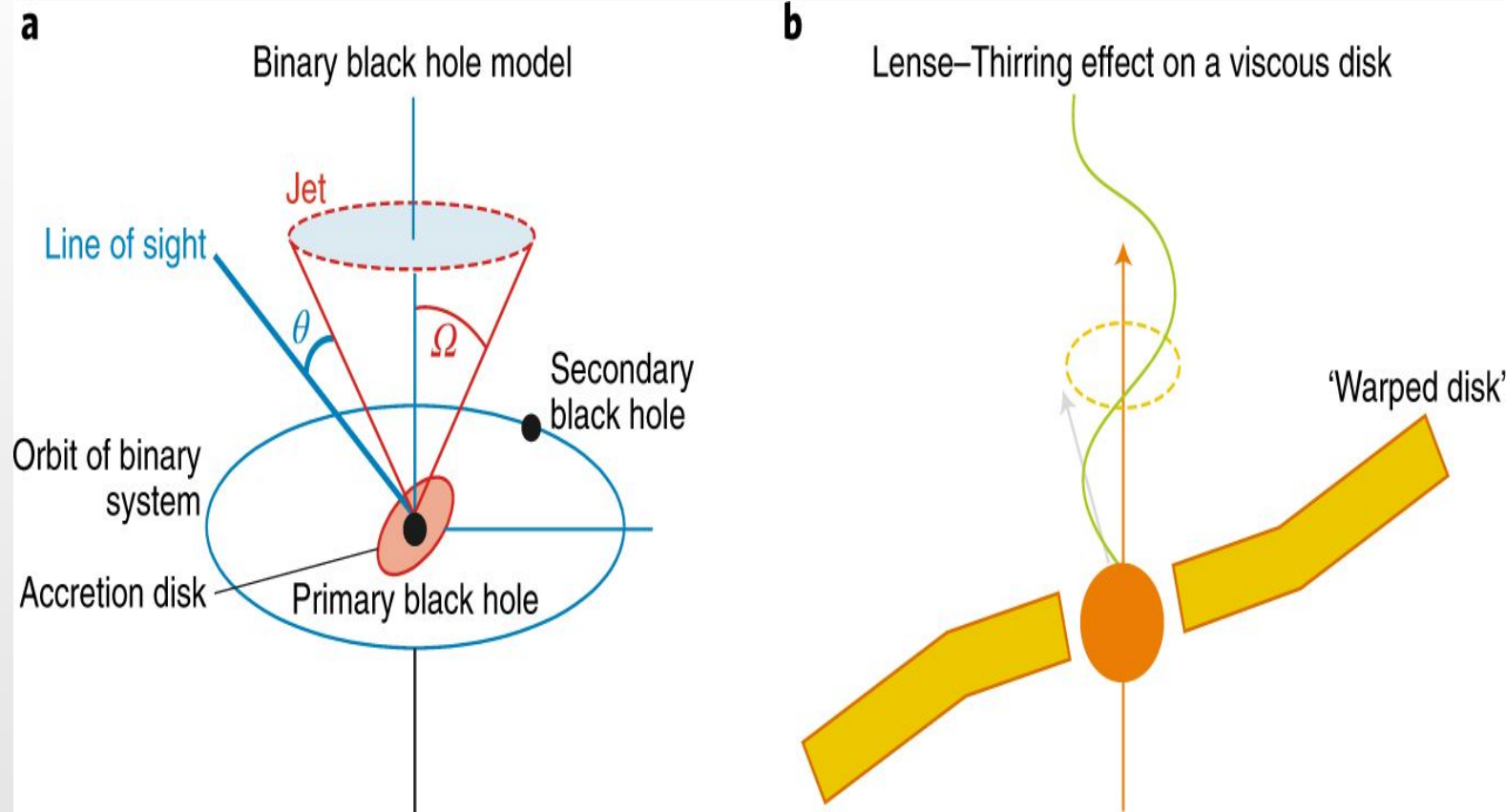


1.The optical flux could be the superposition of thermal emission from the accretion disk and a non-thermal contribution from a precessing jet.

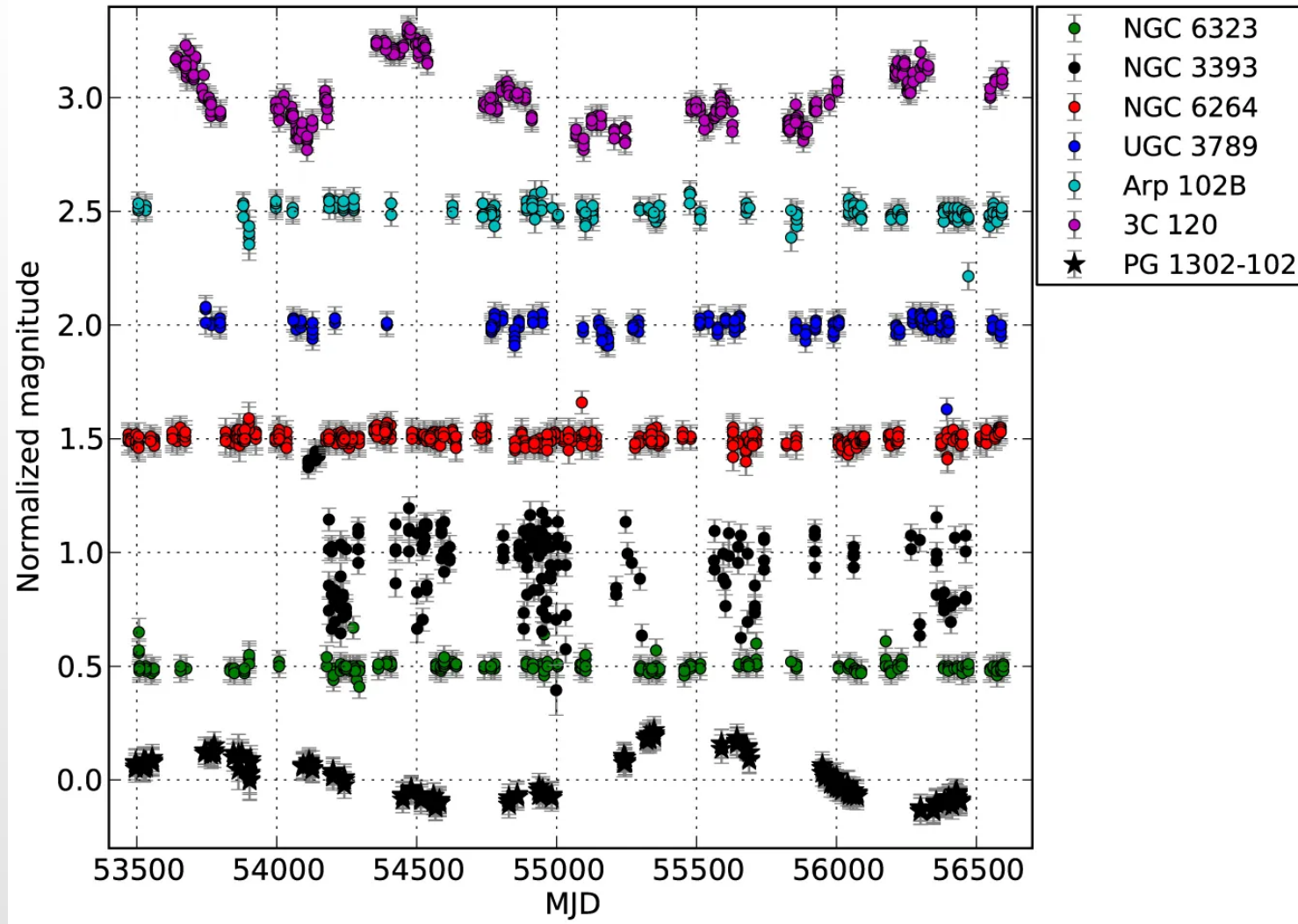
2.Temporary hotspot in the inner region of an accretion disk.

3.A warped disk eclipsing part of the continuum as it precesses.

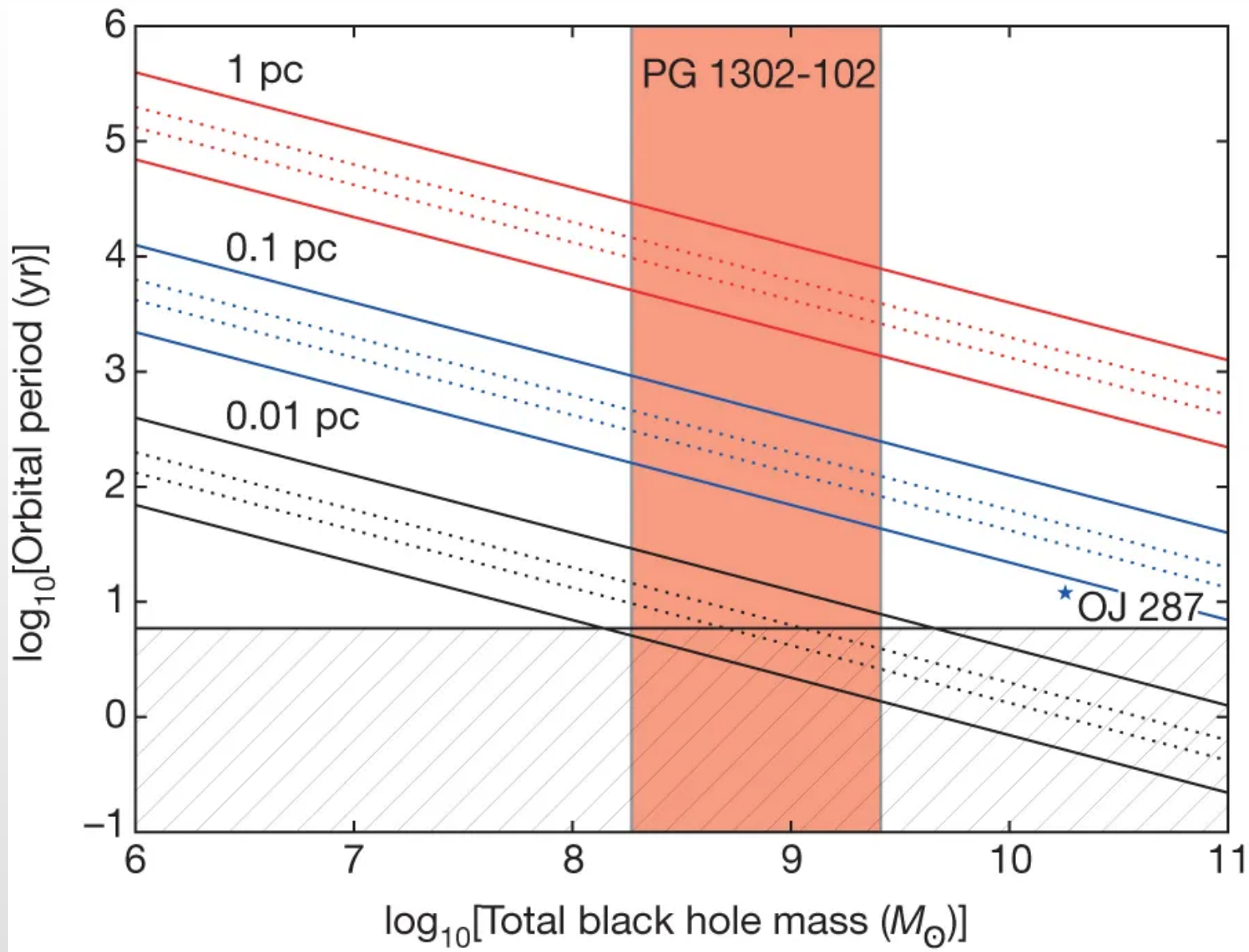
周期性光变的解释



双黑洞中喷流的进动
Zulema Abraham .2018



The optical light curves of quasars with warped accretion disks.



The parameter space of SMBH binary pairs.