

**Referee report: Local Zeta Functions of Multiparameter Calabi-Yau Threefolds from the Picard-Fuchs Equations, by Philip Candelas, Xenia de la Ossa, and Pyry Kuusela**

Note: My referee report is with regard to v3 of this paper, as posted on the arXiv.

As I am the third referee to submit my report (apologies for the slight delay), I will refrain from the opening summary of the new results in this paper. Suffice it to say that it is an impressive piece of work which represents an important advance in our ability to compute local zeta functions of Calabi-Yau models. The authors do an admirable job of making the presentation accessible also to newcomers to the field. In particular Appendix B stands out as a model of pedagogy in a technically very demanding paper. The threshold for publication is clearly met.

I will end with a longish list of typos the authors may wish to correct before final publication (I have attempted to cross-check with the other two referee reports to avoid duplication):

1. p2, last line of last paragraph: “However, we are able TO”.
2. p3,  $E(\varphi)$  entry: “constanT basis”.
3. p4, middle: “the number of  $F_p$  points” should read “... of  $F_{p^n}$  points”.
4. p7, (2.8) should end on a period.
5. p13, first paragraph: “a universal”, not “an universal”, middle: “We can view the Frobenius map AS”.
6. p14, caption: “and the matrix  $U_p(\varphi)$  IS well-defined”.
7. p15, first sentence of section 3.2: the two sentences separated by the comma after  $\mathcal{M}_{CS}$  must be linked differently.
8. p17, above (3.12): “is then written in matrix form” (no “the” before matrix).
9. p18, top: “we are able to use  $\gamma$  TO obtain”, middle: “coordinates” twice, below (3.17): “Notice that if WE interpret”.
10. p19, second paragraph: “and further BY the fact that in THE one-parameter”, below (3.24): “we are studying AND”.
11. p20, first sentence of section 3.6: “As remarked earlier, the action” (no “since”), end of that paragraph: “we need TO use”.
12. p21, last paragraph: “could in principle BE used”, further down: “to fix A p-adic”, “the series needS to be computed”.
13. p22, below first equation: “gives each coefficient” (no “a” in front of “each”), no period after  $U_p(\phi)$  at the end of that sentence.
14. p23, middle: “(4.11) no longer holdS”, last line: “of varieties” (no “a” before varieties).
15. p25, before (4.2): “better idea OF”.

16. p26 middle: “it is then” (lower case “i” on “it”), “the example of THE mirror octic”, bottom of page “raised to THE p’tth”.
17. p27, before (4.4): “discussion, given” (no second “be”).
18. p28, first sentence: “iS fixed explicitly”.
19. p36, middle: “analogously to that” (no “the”), next paragraph “of THE  $\Gamma$ -class”.
20. p38, second paragraph: “convergent” should read “Cauchy”.
21. p39, top: “Numbers  $\eta$  such that both  $\eta$  and  $1/\eta$  ARE p-ADIC INTEGERS ARE p-adic unitS”, middle: “Since  $\mathbb{Q}_p$  is” (no “the”, or else plural in the rest of the sentence).
22. p41, bottom: “Let us denote ... THE basis ... IN WHICH”.
23. p42, middle: “into account” .
24. p43, second paragraph: “by APPEALING to” (rather than “applying”), last paragraph: “we therefore substitutE ... and evaluatE”.