

## Recommendation for Raffaele Marcovecchio

I first met Raffaele Marcovecchio some years ago, when I was a visiting professor at the University of Pisa. He was writing his memoir for the master in mathematics. This was a good work in which he introduced several new ideas about birational transformations of some multiple integrals of rational functions. After his PhD he moved for one year for a non permanent position at the University of Caen. His paper in Ann. Scuola Normale Sup. Pisa in 2006 is an interesting generalization of the famous result of Rivoal on the linear independence of the values of polylogarithms at algebraic numbers.

Now I would explain his remarkable recent result on the irrationality measure of  $\log(2)$ , which is now published in Acta Arithmetica. The best known irrationality measure of  $\log(2)$  was  $3.89\dots$  given by Rukhadze in 1987. Marcovecchio's result is  $3.57\dots$  but, the most important thing, is that the method he used has new features. I have to say that he worked alone for this result.

The first step, and the most important, is the construction of a double integral of a rational function with five unknown integer parameters on a product of two half lines of the complex plane. This integral gives 2 linear forms in  $\log(2)$  and  $\log^2(2)$ . This is original and very clever. Then he has to prove that these linear forms are small and to give an upper bound of the least common multiple of the denominators of their coefficients. For this purpose he uses an algebraic method which was first introduced by C. Viola and myself. He finds a group of transformations of order 36 which acts on the integral. The subgroup which leaves invariant his integral has order 6. This part is completely new and requires many clever ideas. The final part of the proof is very technical, he uses a method of Sorokin and the  $\mathbb{C}^2$ -saddle point method of Hata. He improves also the non-quadraticity measure of  $\log(2)$  given by Hata.

This result is a brilliant result in diophantine approximation, and will certainly bring new results in the next years. My conclusion is that Raffaele Marcovecchio is one of the brilliant young resarchers in number theory.

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