

# **An interesting result without any cryptological implications**

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# The result

**There exists a sequence of finite fields of increasing size over which the elliptic curve discrete logarithm problem can be solved in subexponential time.**

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**Theorem.** Let  $\epsilon > 0$ . Then one can solve the discrete logarithm problem in elliptic curves over finite fields of the form  $\mathbb{F}_{q^n}$  with  $(2 + \epsilon) \cdot n^2 \leq \log_2(q)$  in an expected time which is polynomial in  $q$ .

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**Corollary.** Let again  $\epsilon > 0$ , and let  $a > 2 + \epsilon$ . Then one can solve the discrete logarithm problem in elliptic curves over finite fields of the form  $\mathbb{F}_{q^n}$  with

$$(2 + \epsilon) \cdot n^2 \leq \log_2(q) \leq a \cdot n^2$$

in an expected time of

$$e^{\mathcal{O}(1) \cdot (\log(q^n))^{2/3}}.$$

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Indeed, the expected running time is polynomial in

$$q = 2^{\log_2(q)} = 2^{(\log_2(q))^{(1+1/2) \cdot 2/3}} \leq 2^{(\sqrt{a} \cdot n \log_2(q))^{2/3}}.$$

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# A question

Why was the result presented at the Rump Session of Eurocrypt 2008?