

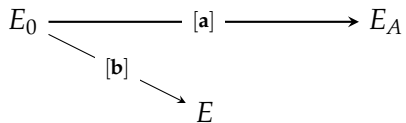
Speedier snail signatures

Thomas Decru Lorenz Panny Frederik Vercauteren

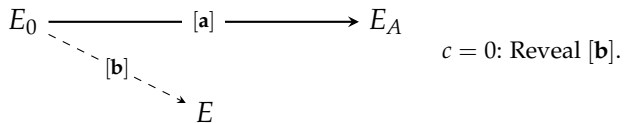
ID scheme from group actions [Couveignes, Stolbunov]:

$$E_0 \longrightarrow [a] \longrightarrow E_A$$

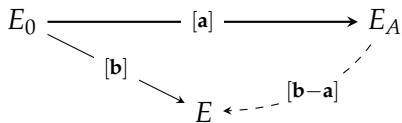
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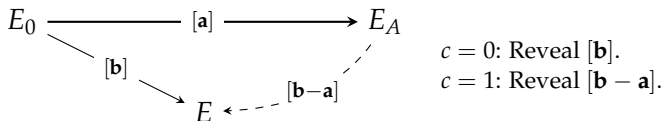
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$c = 0$: Reveal $[b]$.

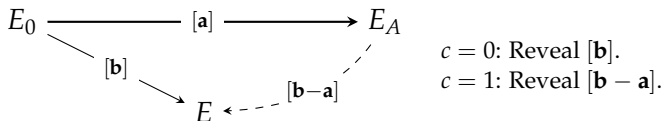
$c = 1$: Reveal $[b - a]$.

ID scheme from group actions [Couveignes, Stolbunov]:



- ▶ Problem: How to represent $b - a$ without **leaking**?
(Distribution of $b - a$ **depends** on a !)

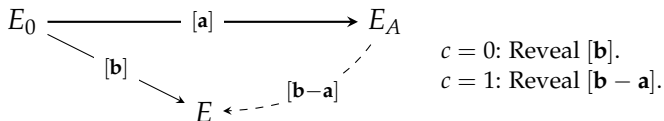
ID scheme from group actions [Couveignes, Stolbunov]:



- ▶ Problem: How to represent $\mathbf{b} - \mathbf{a}$ without **leaking**?
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- ▶ Recall: CSIDH uses vectors $\mathbf{e} \in \mathbb{Z}^n$ to represent $[\prod_{i=1}^n t_i^{e_i}]$.

SeaSign [De Feo–Galbraith]

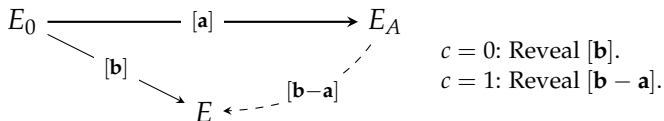
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- ↪ The *SeaSign* scheme takes \mathbf{b} in a **big** box $\subseteq \mathbb{Z}^n$
and **rejects** a query $c = 1$ when $\mathbf{b} - \mathbf{a}$ is close to the **border**.

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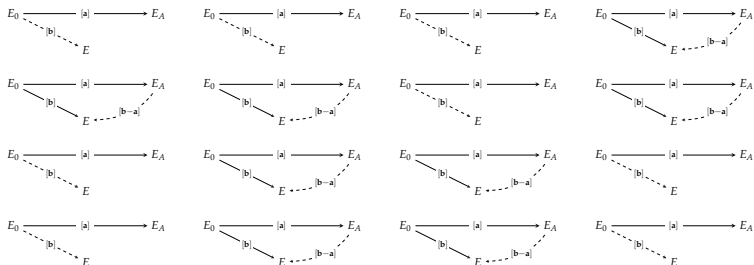
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and **rejects** a query $c = 1$ when $\mathbf{b} - \mathbf{a}$ is close to the **border**.
- ↪ Distribution of **revealed** vectors $\mathbf{b} - \mathbf{a}$ is **independent** of \mathbf{a} .
- ▶ ...but tiny rejection probabilities require **huge** boxes.

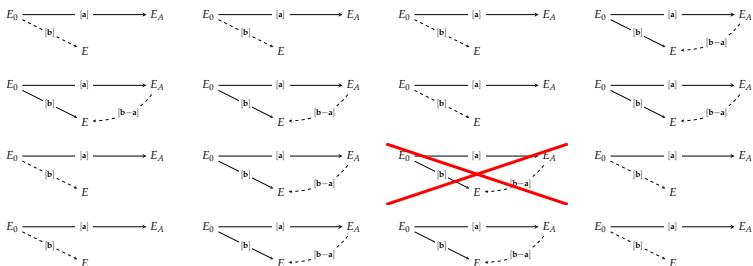
SeaSign [De Feo–Galbraith]

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SeaSign [De Feo–Galbraith]

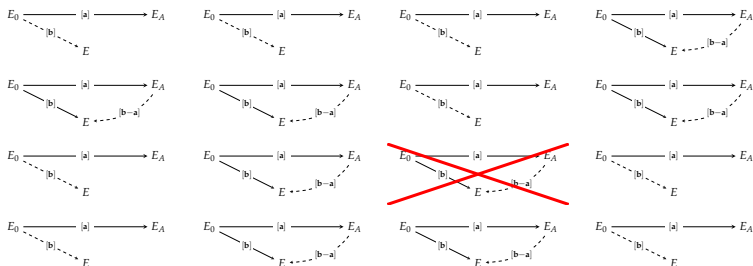
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- ▶ SeaSign: A **single** rejection **X** spoils the whole thing.

Faster SeaSign [us]

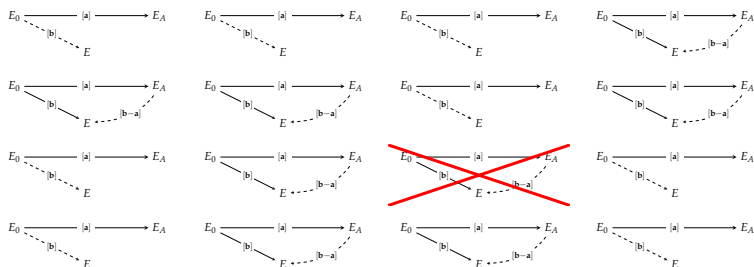
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Faster SeaSign [us]

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- ▶ SeaSign: A **single** rejection **X** spoils the whole thing.
 - ▶ Our idea: Why not **allow 'a few' rejections**?
- ↪ need $> \lambda$ correct answers, but can use **smaller** boxes.
↪ **better performance overall!**

Thomas Decru, Lorenz Panny, Frederik Vercauteren:

Faster SeaSign signatures
through improved rejection sampling

<https://ia.cr/2018/1109>

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(between 4× and 65× faster)

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