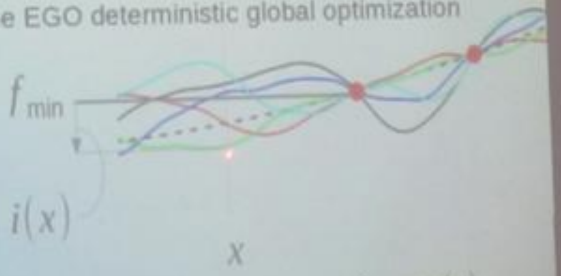
(one point-) Expected improvement

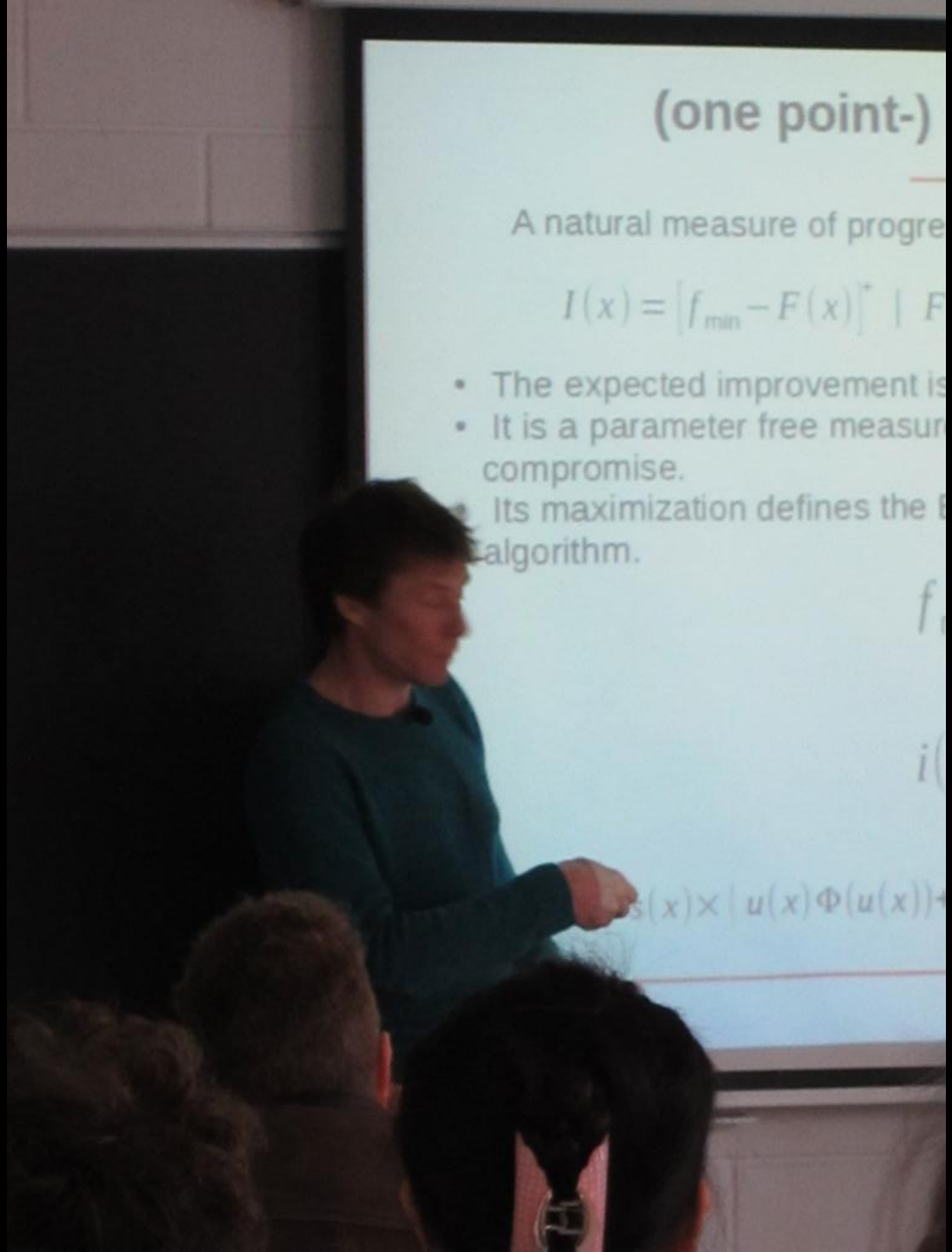
A natural measure of progress : the improvement,

$$I(x) = \left[f_{\min} - F(x) \right]^+ \mid F(x) = f(x) \quad , \quad \text{where } [.]^+ \equiv max(0,.)$$

- The expected improvement is known analytically.
- It is a parameter free measure of the exploration-intensification compromise.
- maximization defines the EGO deterministic global optimization orithm.



$$\times \left(u(x)\Phi(u(x)) + \varphi(u(x)) \right) \quad , \quad \text{where } u(x) = \frac{f_{\min} - m_k(x)}{s(x)}$$


(one point-)
A natural measure of progre
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• The expected improvement is
• It is a parameter free measur
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• Its maximization defines the E
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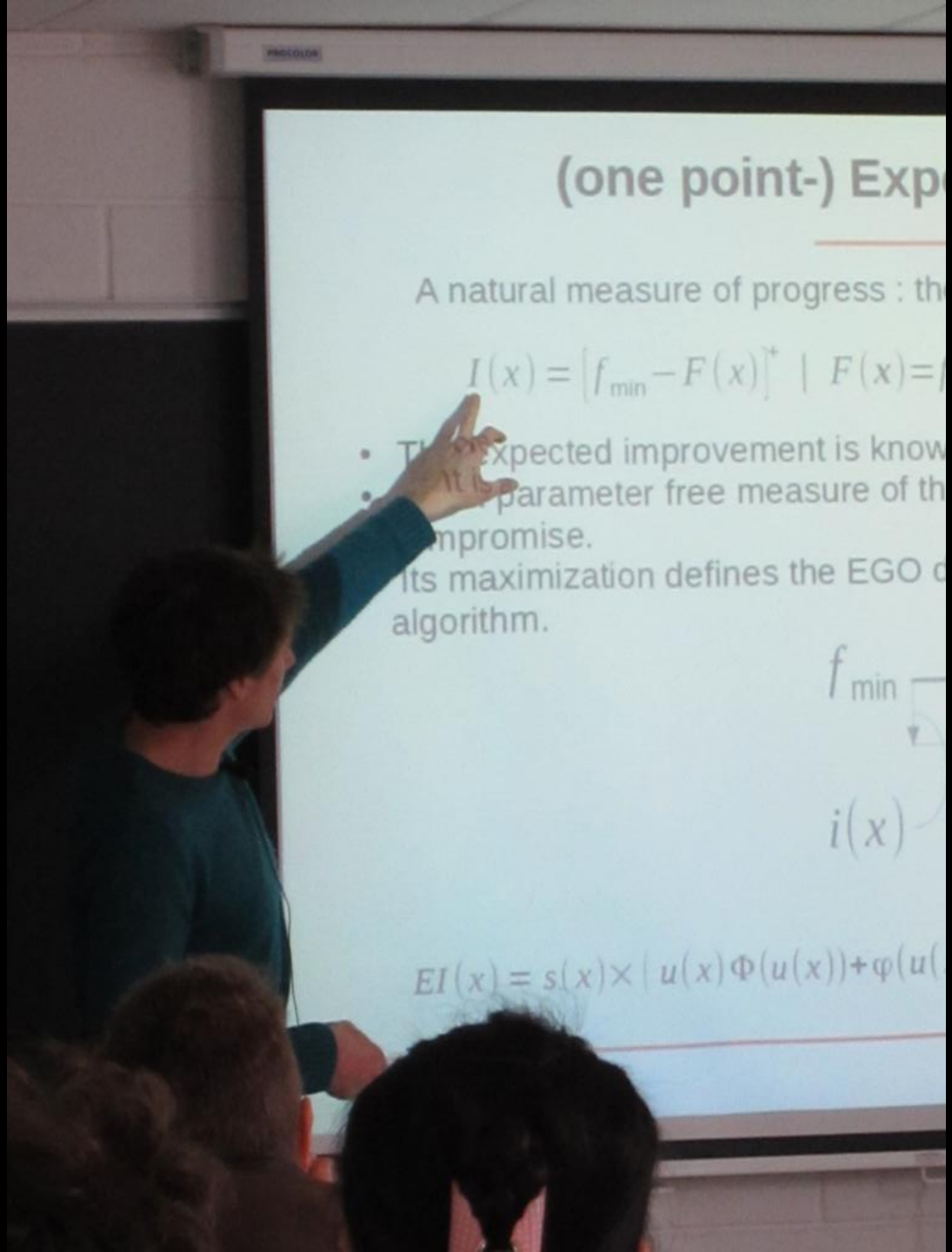
$s(x) \times [u(x)\Phi(u(x))+$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(one point-) Expected improvement
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EGO deterministic global optimization

(one point-) Expected improvement

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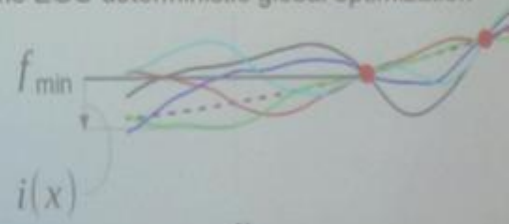
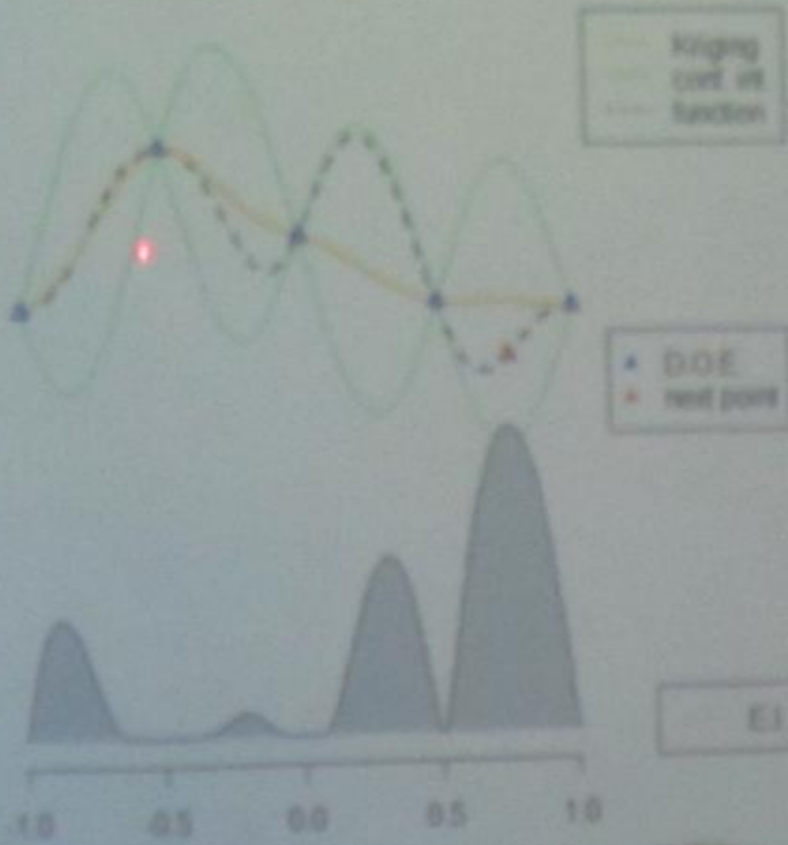


$$EI(x) = s(x) \times \left[u(x)\Phi(u(x)) + \varphi(u(x)) \right] \quad , \quad \text{where } \frac{f_{\min} - m_k(x)}{s(x)}$$

maximizes EI.

$$x^{j+1} = \arg\max_x EI(x)$$



then, the kriging model is updated ...