



sujet 1 Probabilités: Statistique / obs. Science

sujet 2: Cryptographie

sujet 3: Lempert-Lieb (algèbre)

sujet 4: Amida-Kuji

sujet: Les nombres premiers

$$\left(1 - \frac{1}{p}\right)^{-1} = \prod \frac{1}{1 - \frac{1}{p^n}} = \sum_{n=0}^{\infty} \frac{1}{p^n}$$
$$= \prod \left(\sum_{n=0}^{\infty} \frac{1}{p^n} \right) = \sum_{n \in \mathbb{N}} \frac{1}{p^n} = \sum_{n \in \mathbb{N}} \frac{1}{n}$$

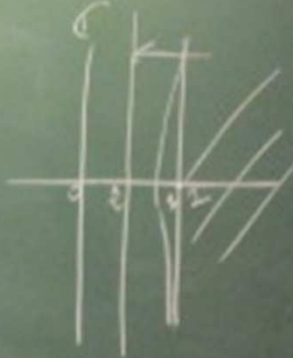
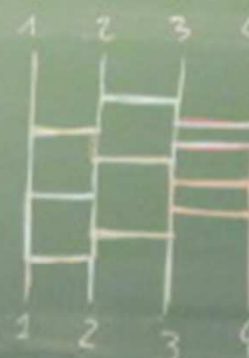
$$\mathcal{P} = \{ p \text{ premier} \}$$

$$\#\mathcal{P} = \left| \pi(x) - \pi(x) \right|$$

$$\pi(x) = \#\{ p \text{ premier} \leq x \}$$

$$\pi(x) \sim \frac{x}{\ln x}$$

$$\sum \frac{1}{n} \sim \ln x$$



$$\frac{1}{2n} \leq \pi(n) \leq \frac{3}{2n}$$

général de A

$$\vec{x} = a\vec{u} + b\vec{v} \quad (a, b) \in \mathbb{R}^2$$
$$\vec{y} = c\vec{u} + d\vec{v} \quad (c, d) \in \mathbb{R}^2$$

$$d = \frac{-(2a+b)}{a+2b} \times c$$

$$\alpha c + \beta d = \gamma$$

$$G = \left(\frac{1}{3} + \frac{1}{3} \right) \vec{u} + \left(\frac{1}{3} + \frac{1}{3} \right) \vec{v}$$

a date col

$$\left(\frac{1}{3} + \frac{1}{3} \right) (a+2b) - (a+b) \left(\frac{1}{3} + \frac{1}{3} \right)$$

$$d(a+2b) + \frac{1}{3}(a+b) = c$$

$$d(a+2b) + c \left(\frac{1}{3} + \frac{1}{3} \right) = \dots$$

caruse $\Delta = 864$

$$d \frac{(a+b)}{3} + c \frac{(a+b)}{3} = \dots$$

$$S: \Delta = (a+b) \text{ abs}$$









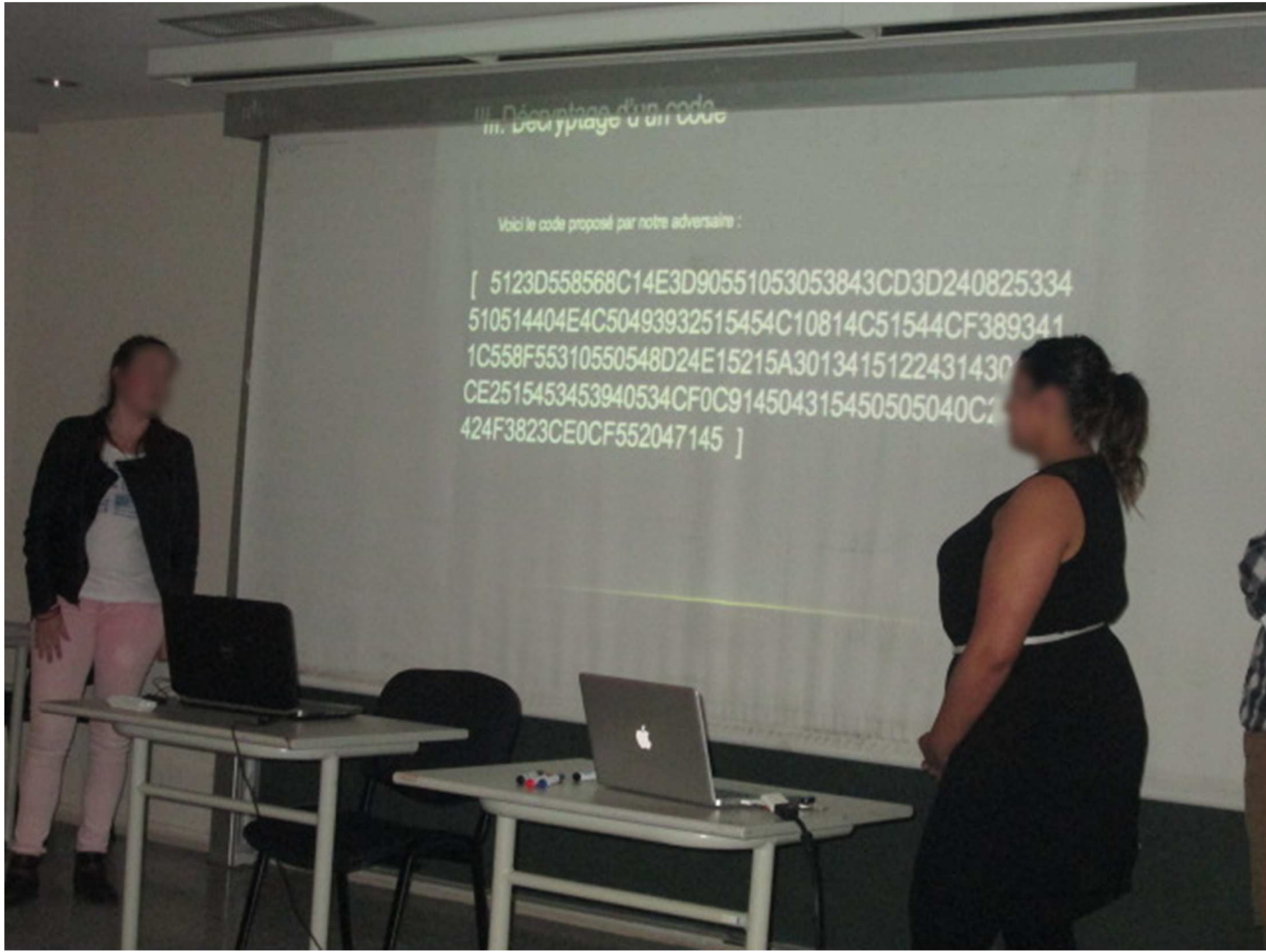




III. Décryptage d'un code

Voici le code proposé par notre adversaire :

```
[ 5123D558568C14E3D90551053053843CD3D240825334  
510514404E4C50493932515454C10814C51544CF389341  
1C558F55310550548D24E15215A3013415122431430  
CE2515453453940534CF0C914504315450505040C2  
424F3823CE0CF552047145 ]
```





Repartition des nombres premiers

$$\pi(x) = \# \{ \text{premier} \leq x \}$$

$$\mathcal{P} = \{ p_1, p_2, \dots, p_n, \dots \}$$

$$p \in \mathcal{P}$$

$$p_n \sim n \ln n$$

$$p_n < A n^2$$

$$p_n > e^n$$

$$\{ x \Rightarrow p_n \in (x, 2x] \}$$

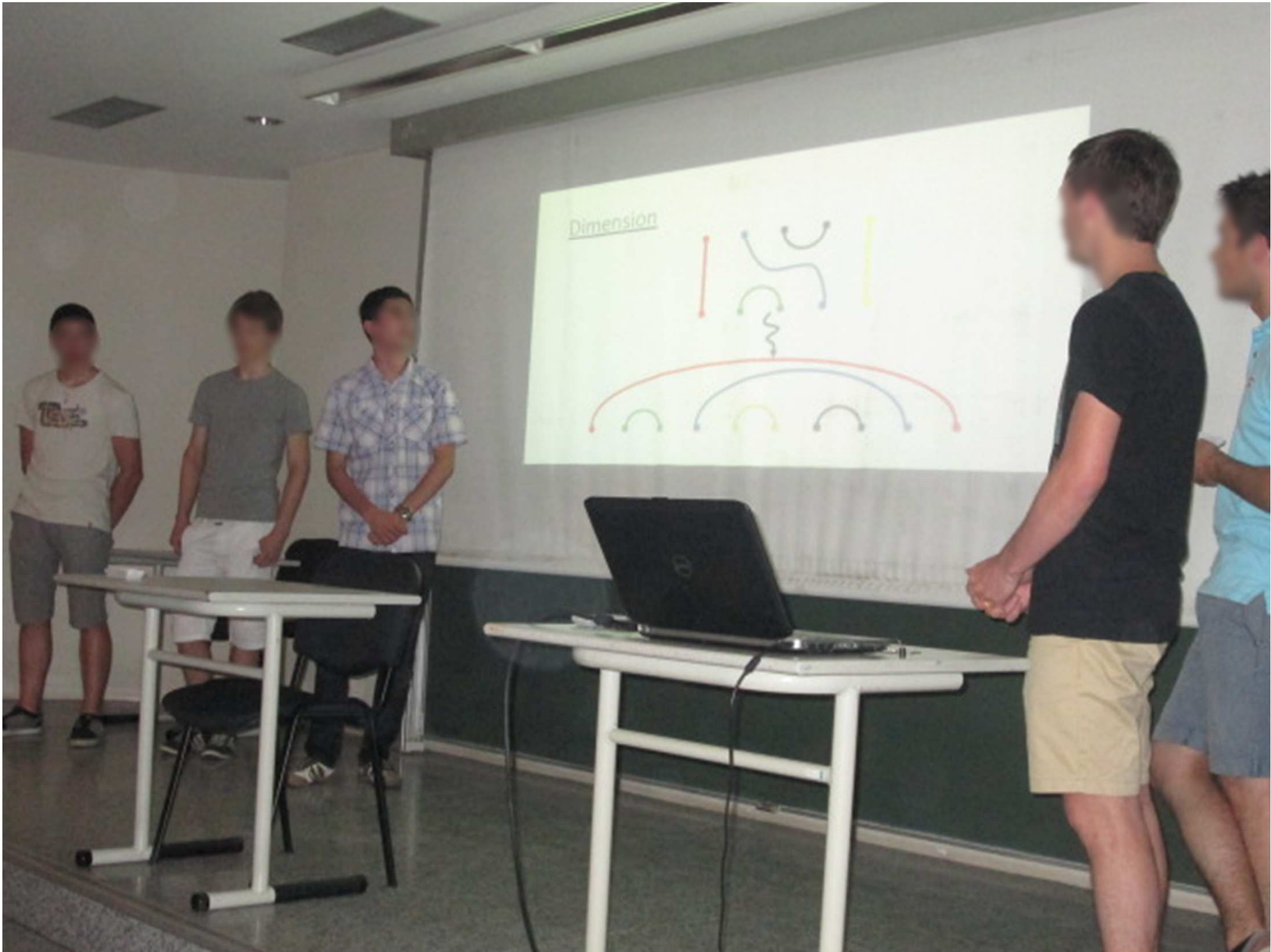
$$n \left(\frac{p_{n+1}}{p_n} \right) = N$$

$$\mathcal{P}(x) \{ p_n \leq x < p_{n+1} \}$$

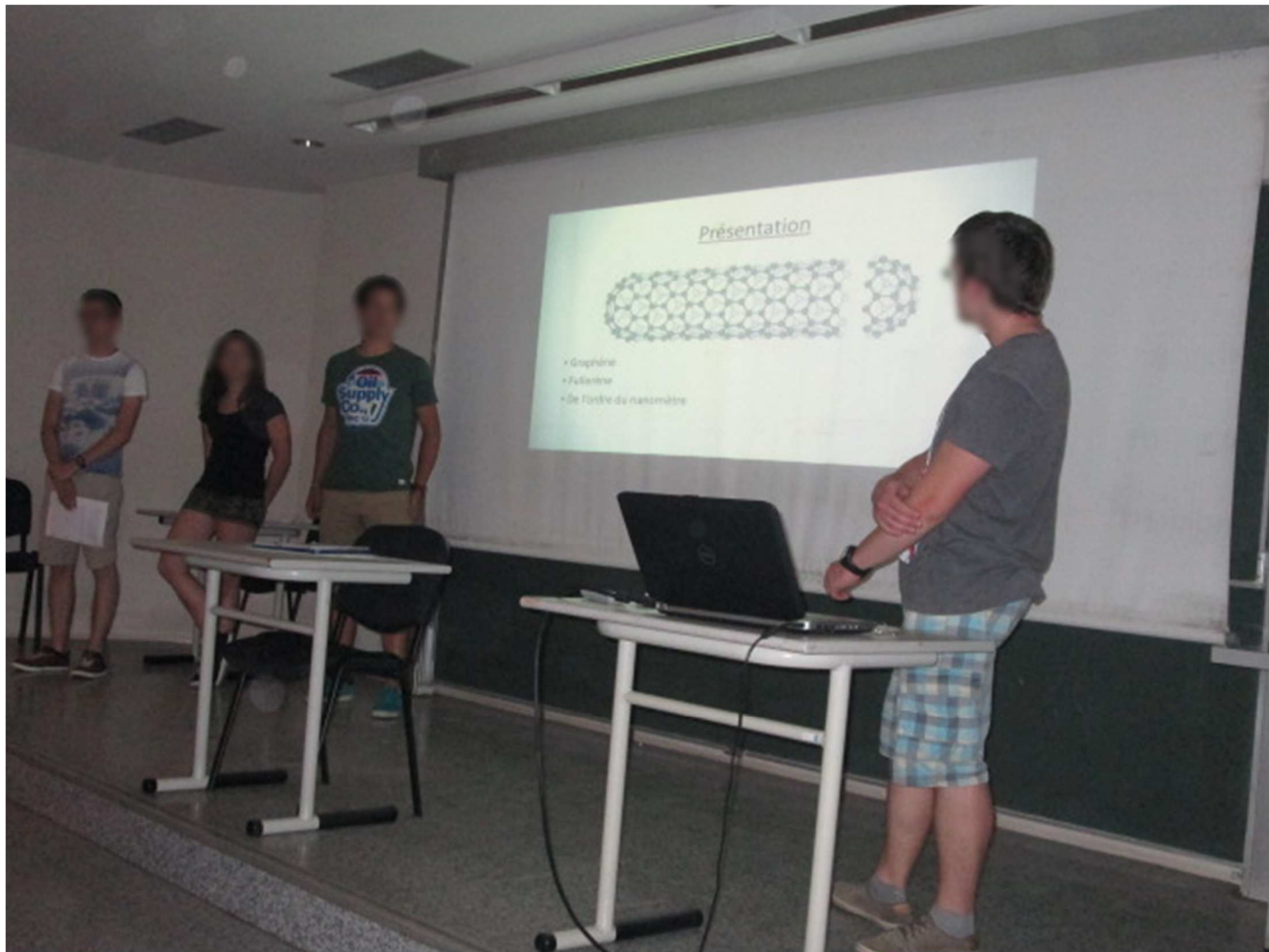
$$\pi(x) \sim N$$

$$c_2 \frac{x}{\ln x} \leq \pi(x)$$









Présentation



- Graphène
- Fullène
- De l'ordre du nanomètre