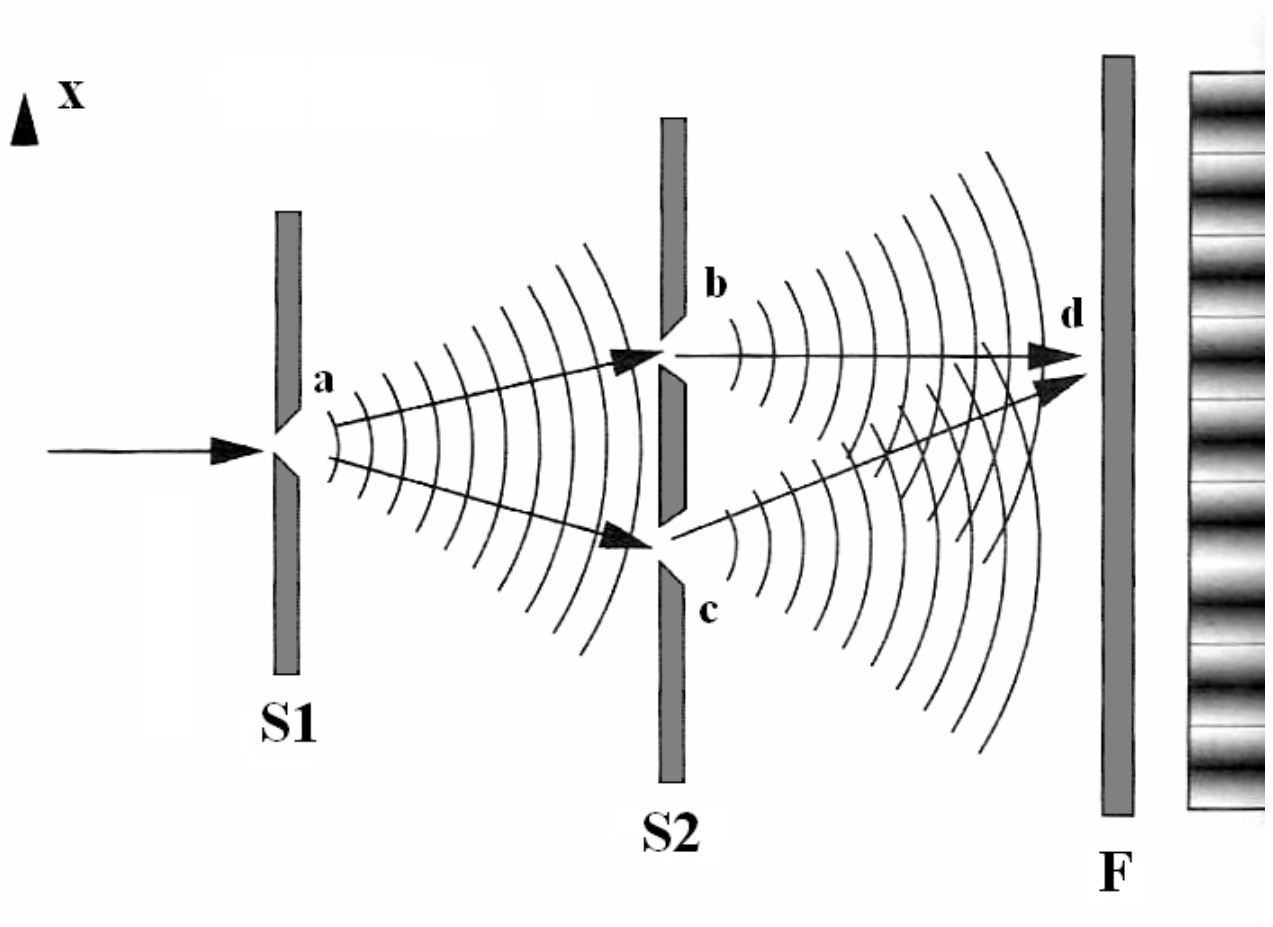
L’ESPERIMENTO DI YOUNG REALIZZATO CON ELETTRONI

Giorgio Matteucci Università - Bologna

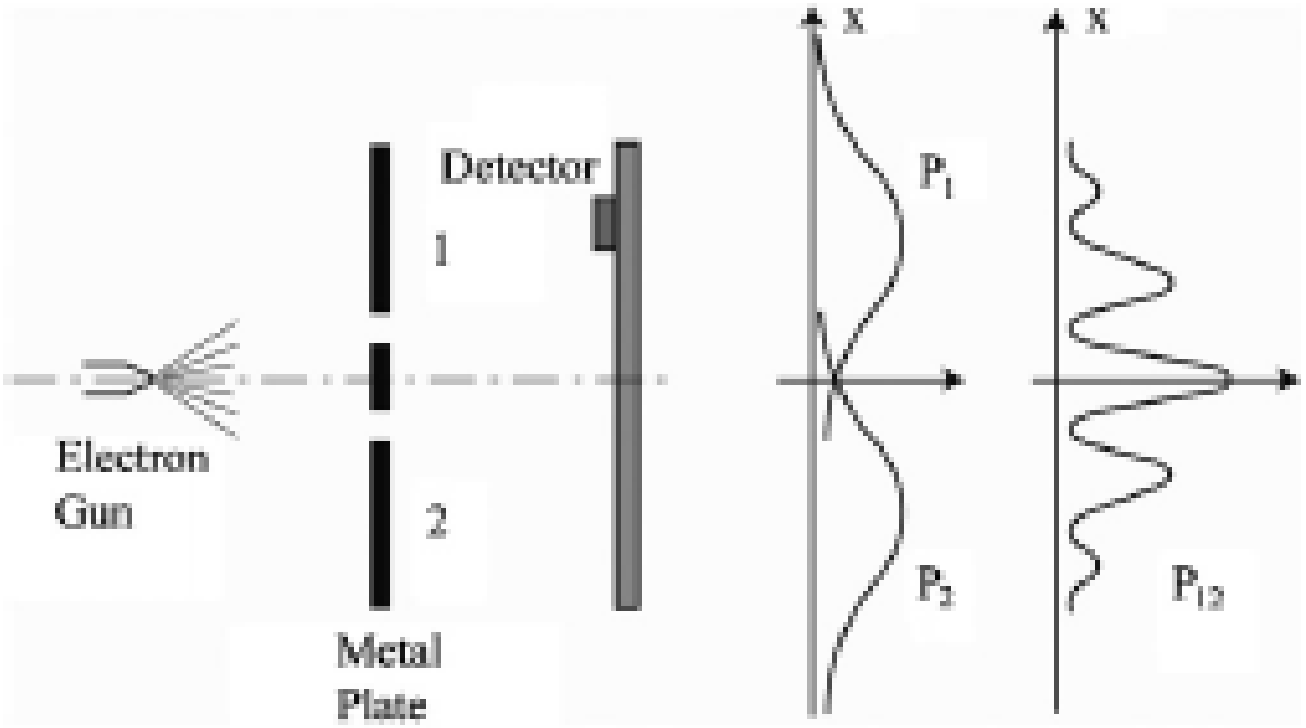
- Esperienza di Young con singoli elettroni
  - Doppia fenditura; un elettrone alla volta

- Strumentazione
  - Microscopio elettronico
  - La doppia fenditura
  - Il sensore APSEL4D

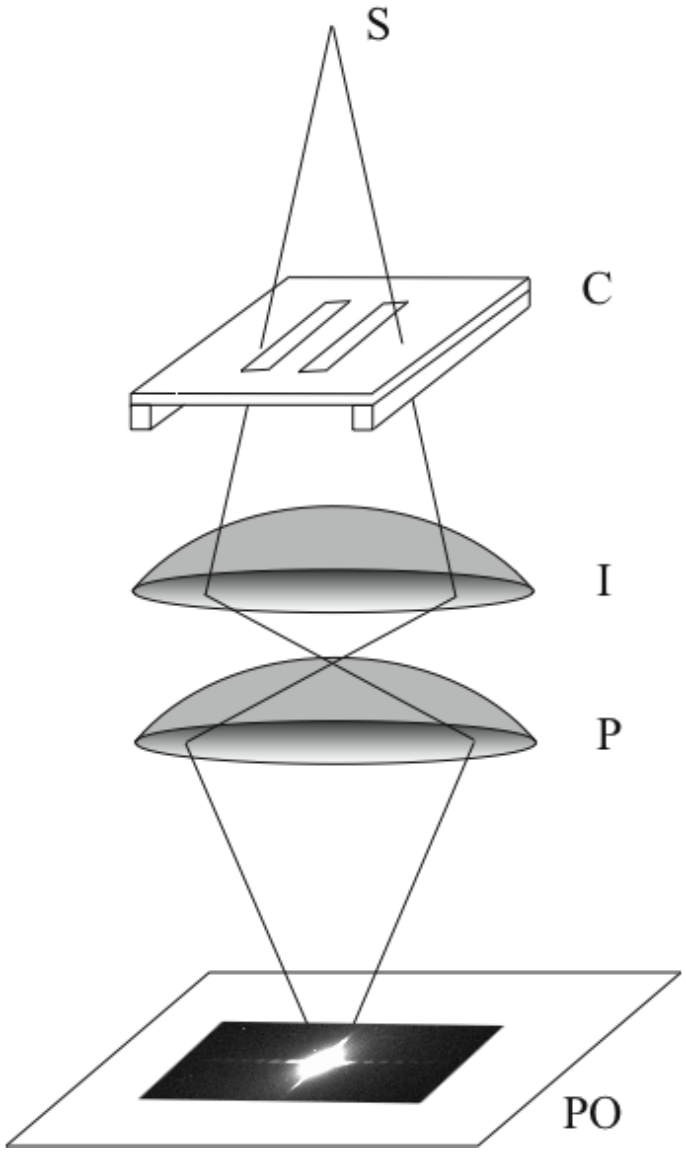
ESPERIMENTO DOPPIA FENDITURA - LUCE

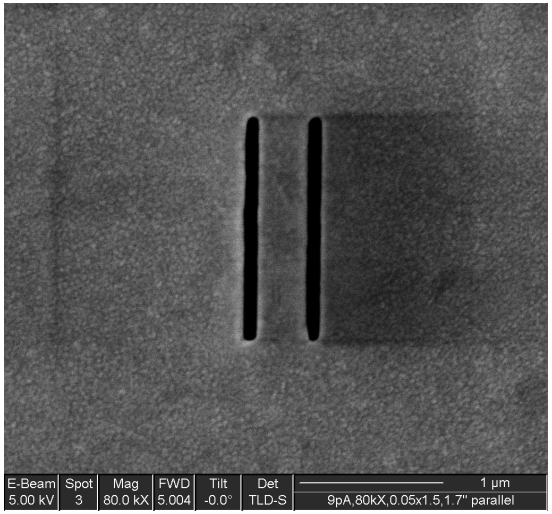


ESPERIMENTO DOPPIA FENDITURA - ELETTRONI

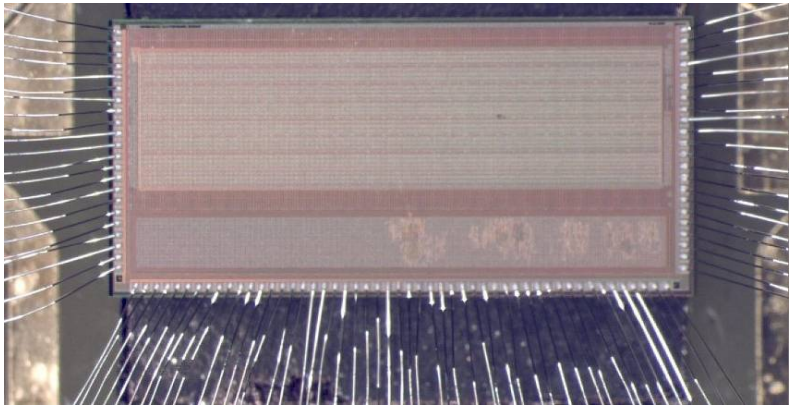


SCHEMA ELETTRO-OTTICO



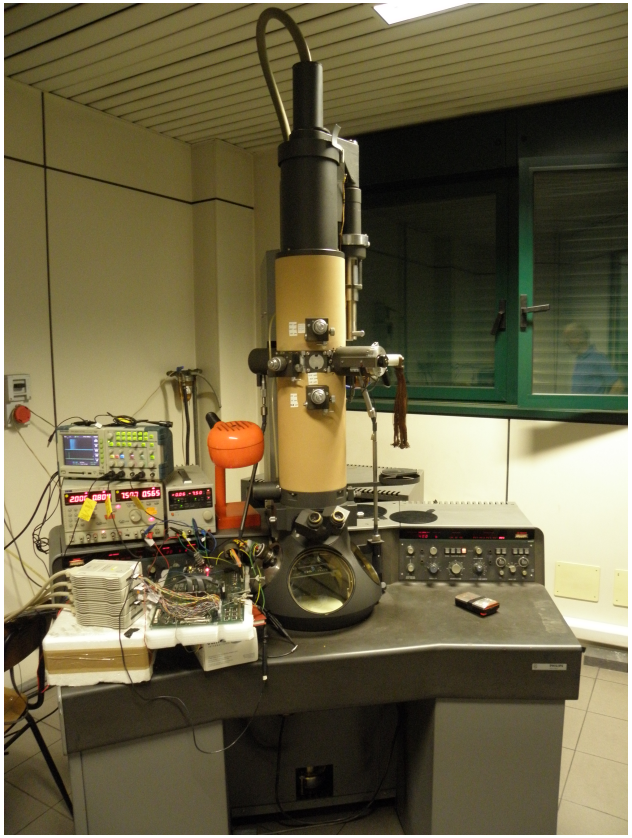


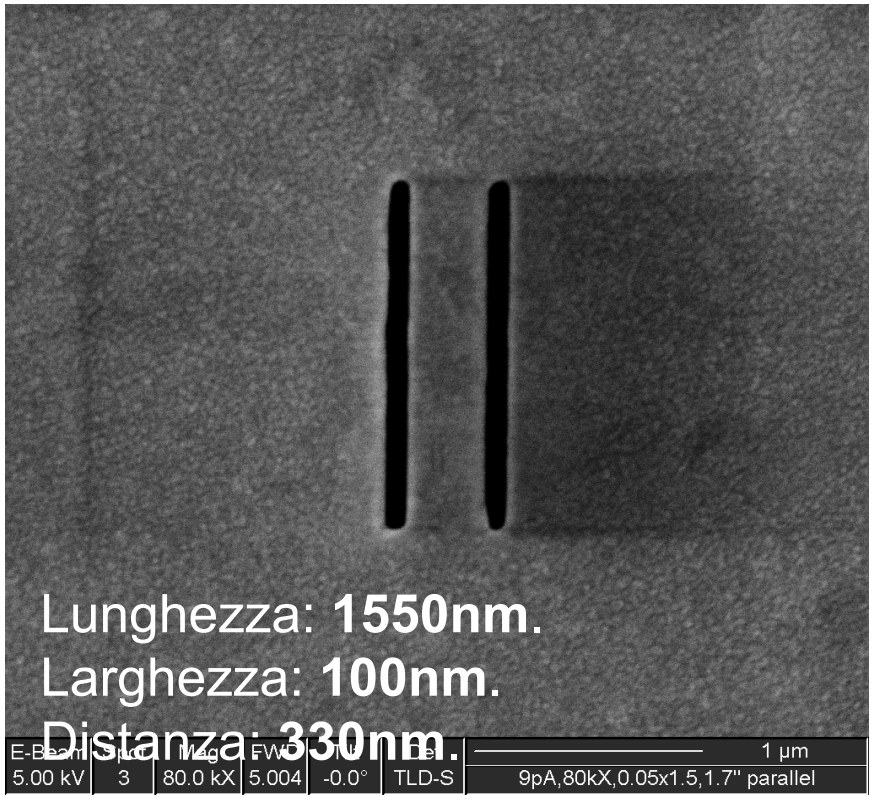
FENDITURE

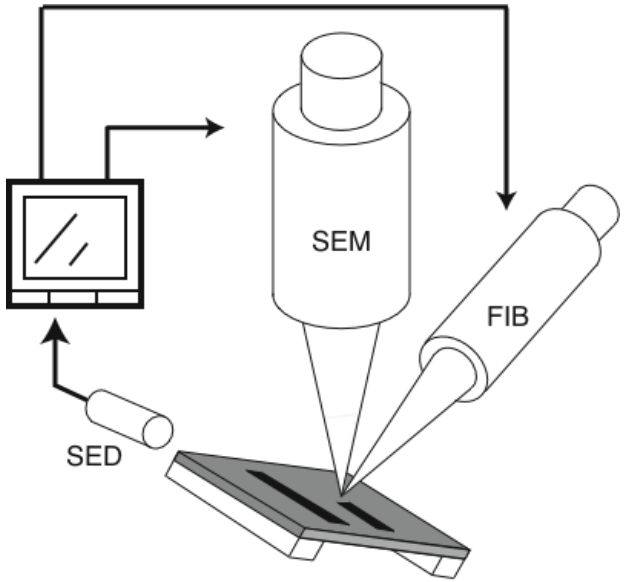


RIVELATORE

TEM







Realizzate con processo FIB

(fascio di ioni concentrato proveniente da una sorgente di Ga+ liquido).

Membrane di carbonio con deposito d'oro (spessore 50-100nm).

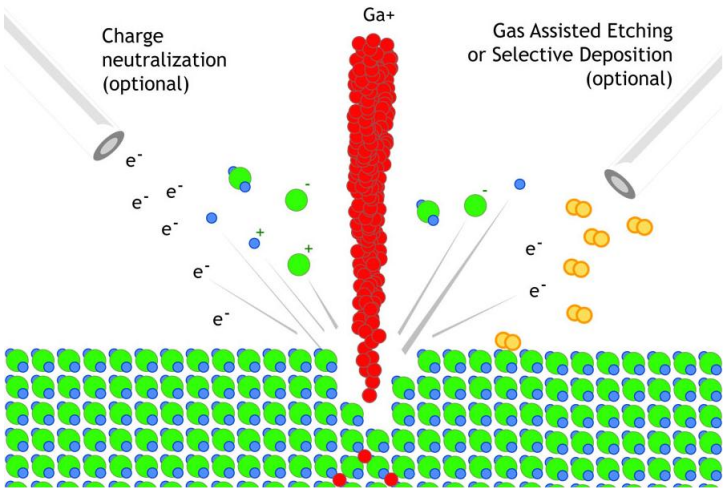
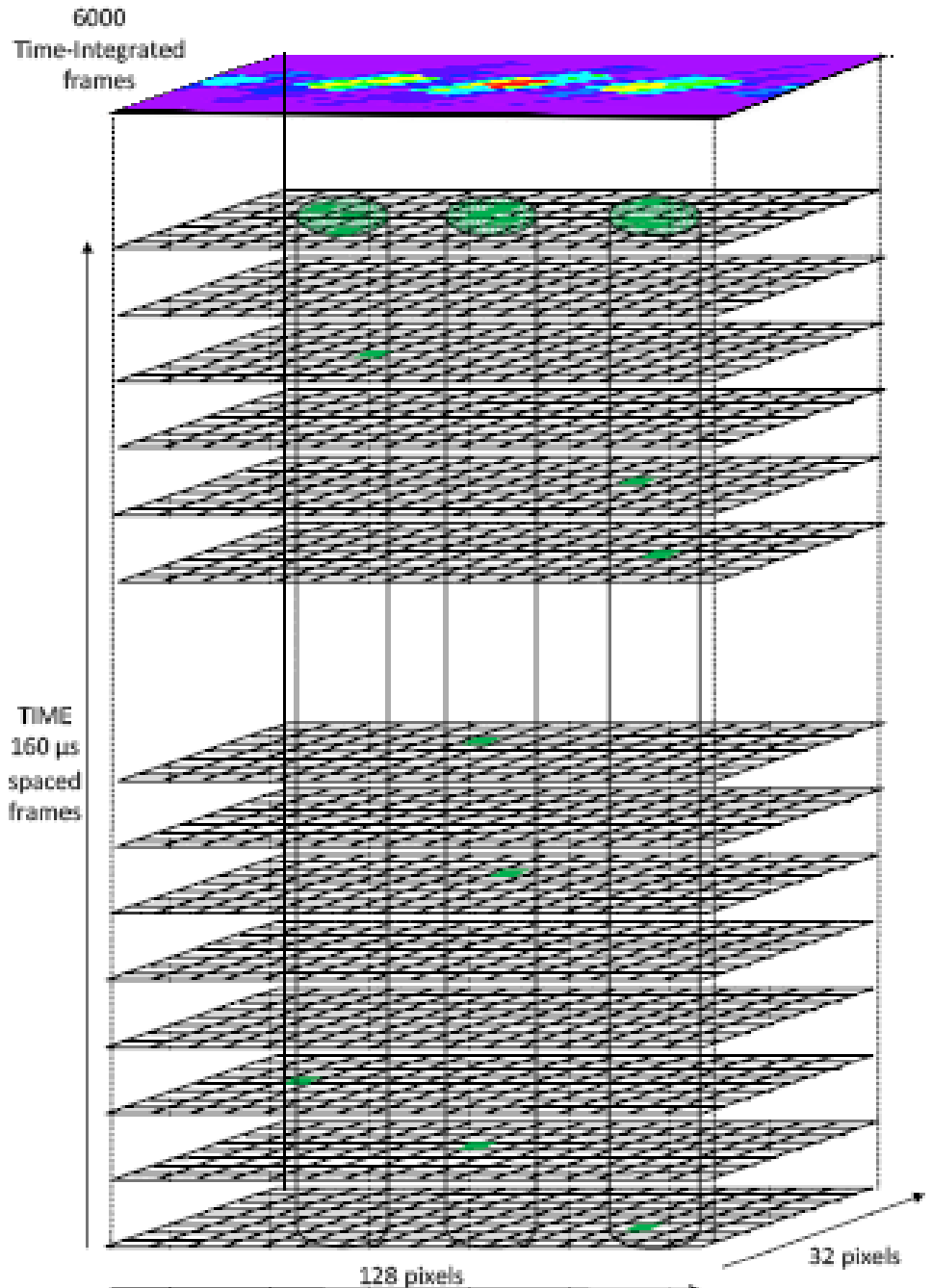
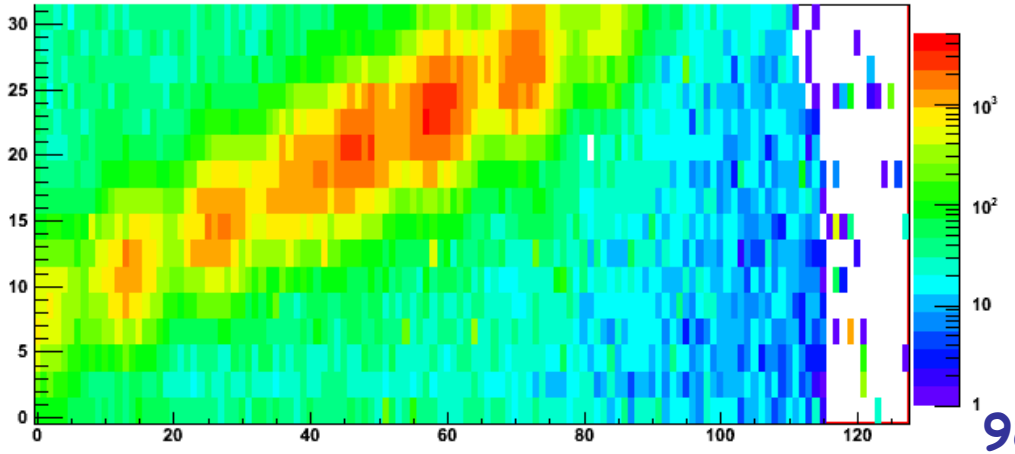


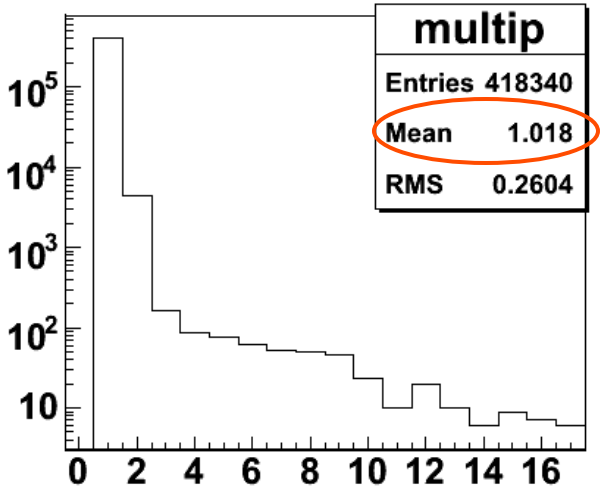
FIGURA INTERFERENZA
SOVRAPPOSIZIONE
MOLTI FRAMES



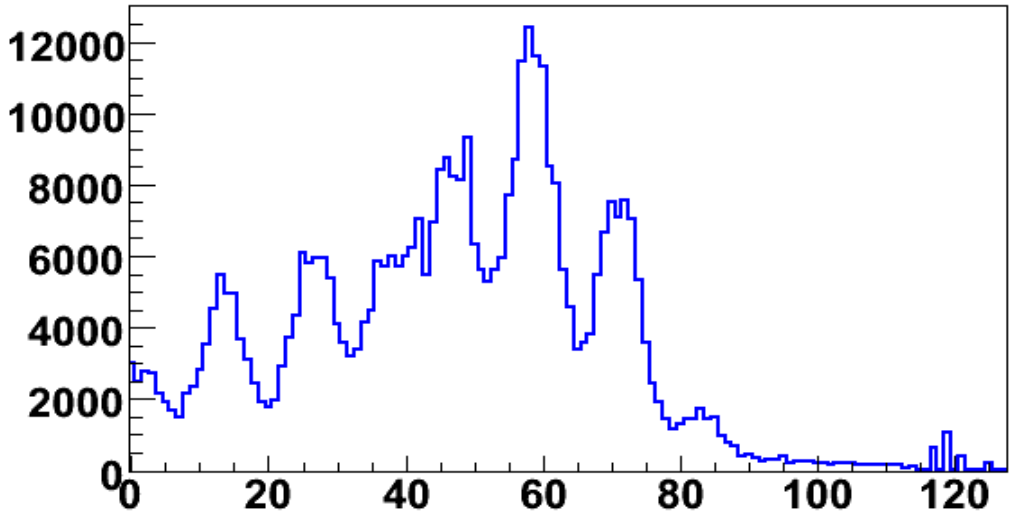
Interferenza di singolo elettrone

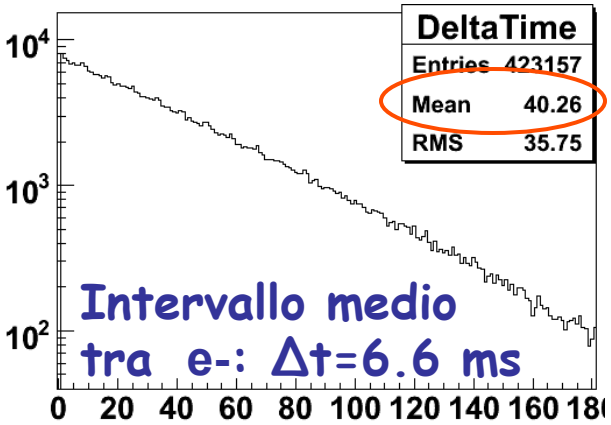
430k elettroni osservati in circa 1h di misura



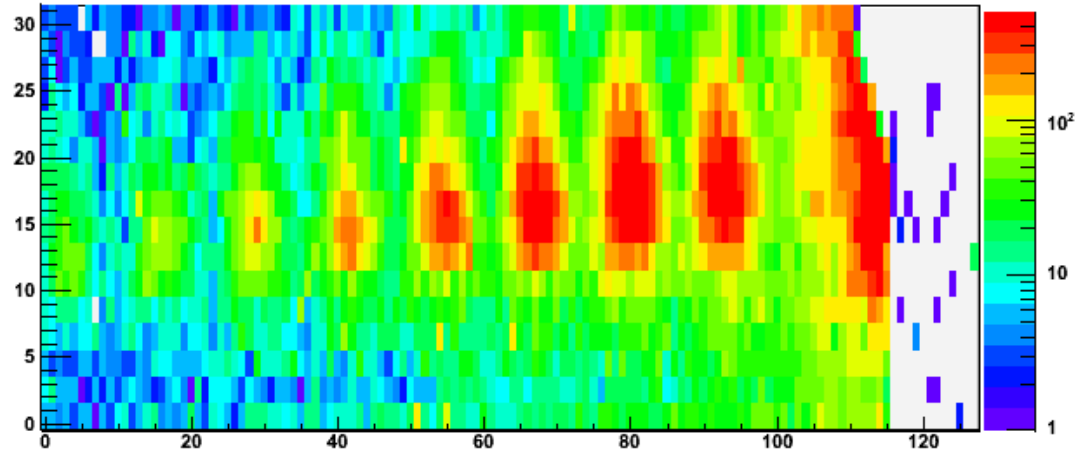


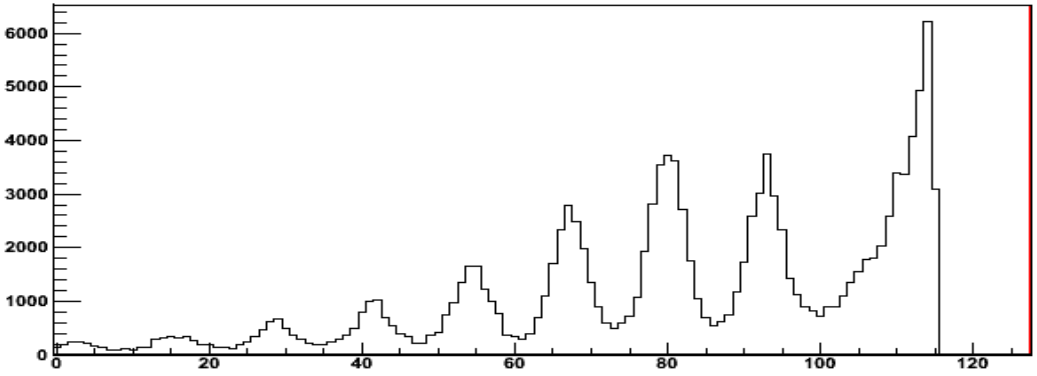
98.8% immagini di singolo e^-

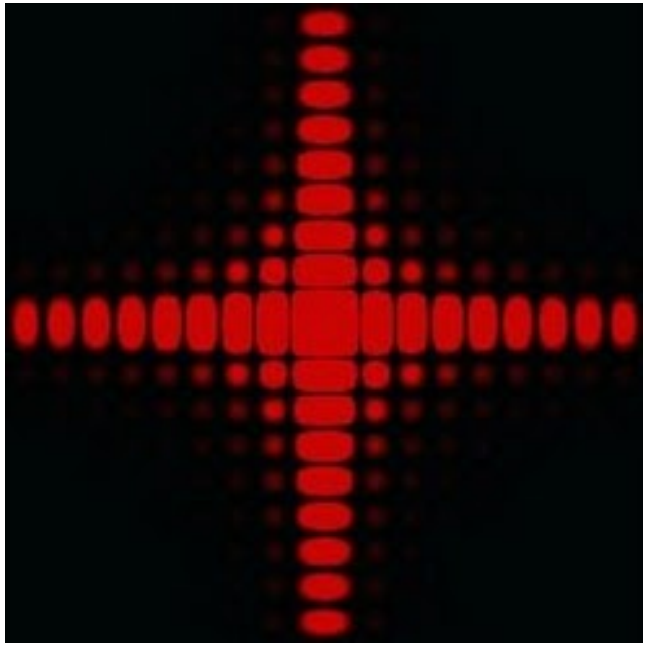




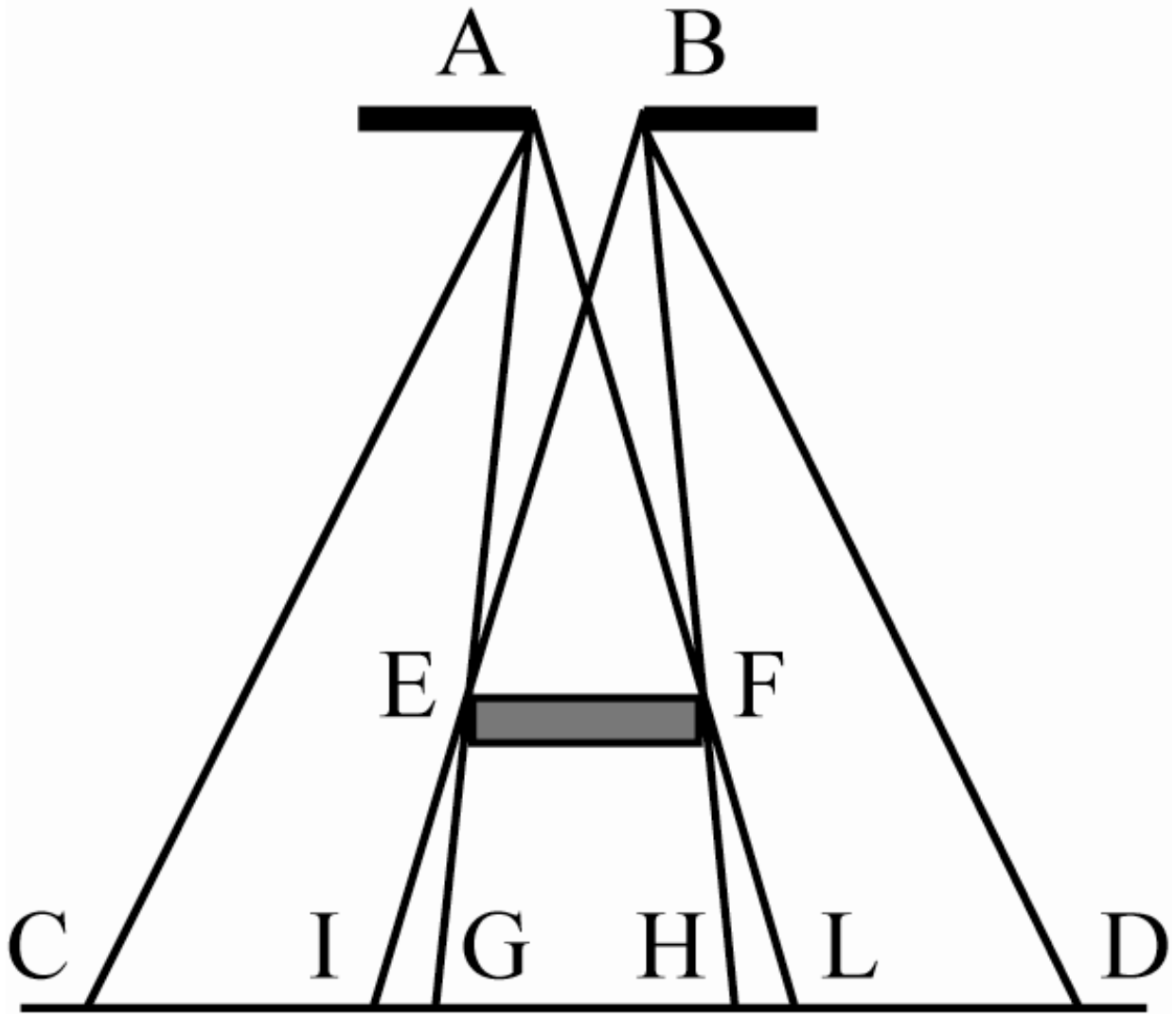
INTERFERENZA DA RETICOLO DI CARBONIO - ELETTRONI SINGOLI



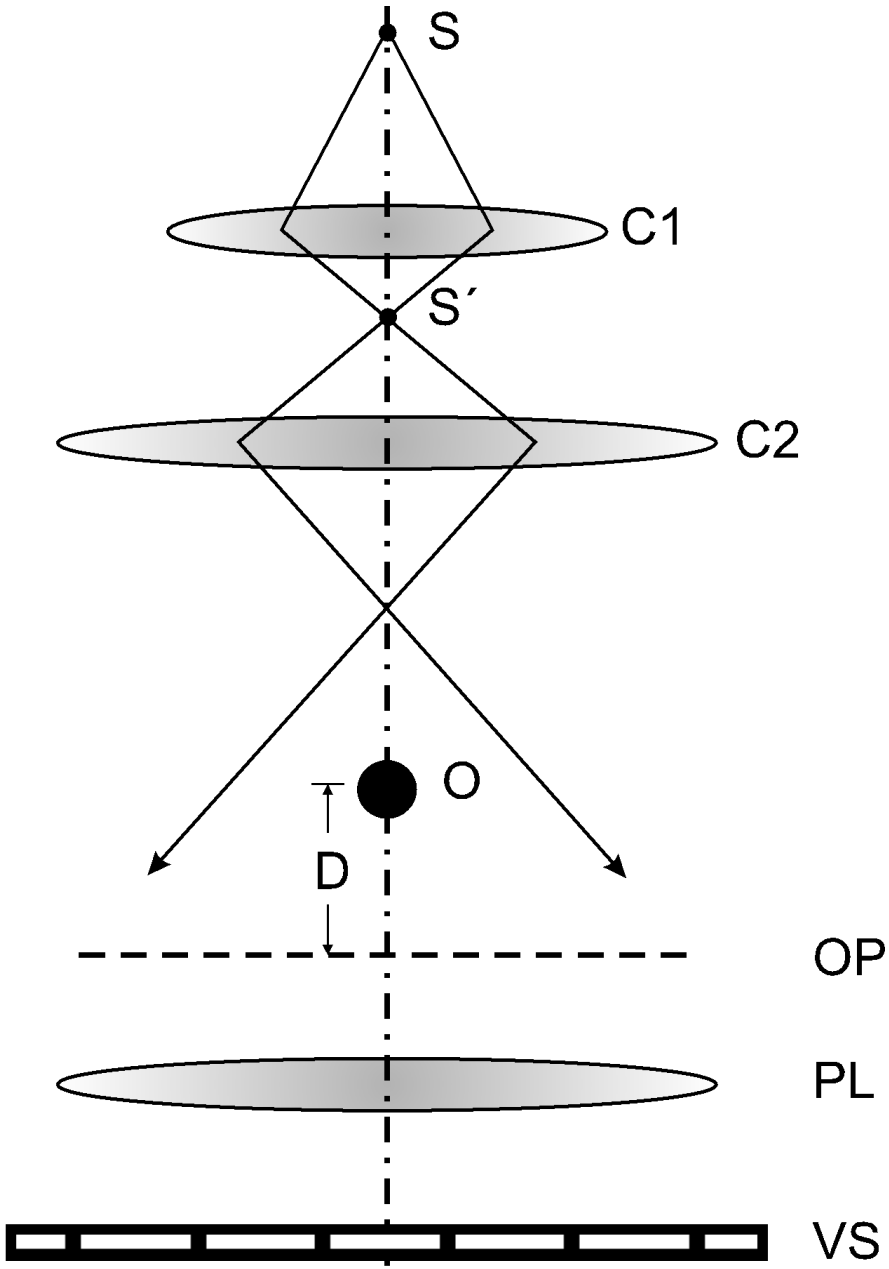




ESPERIMENTO DI GRIMALDI



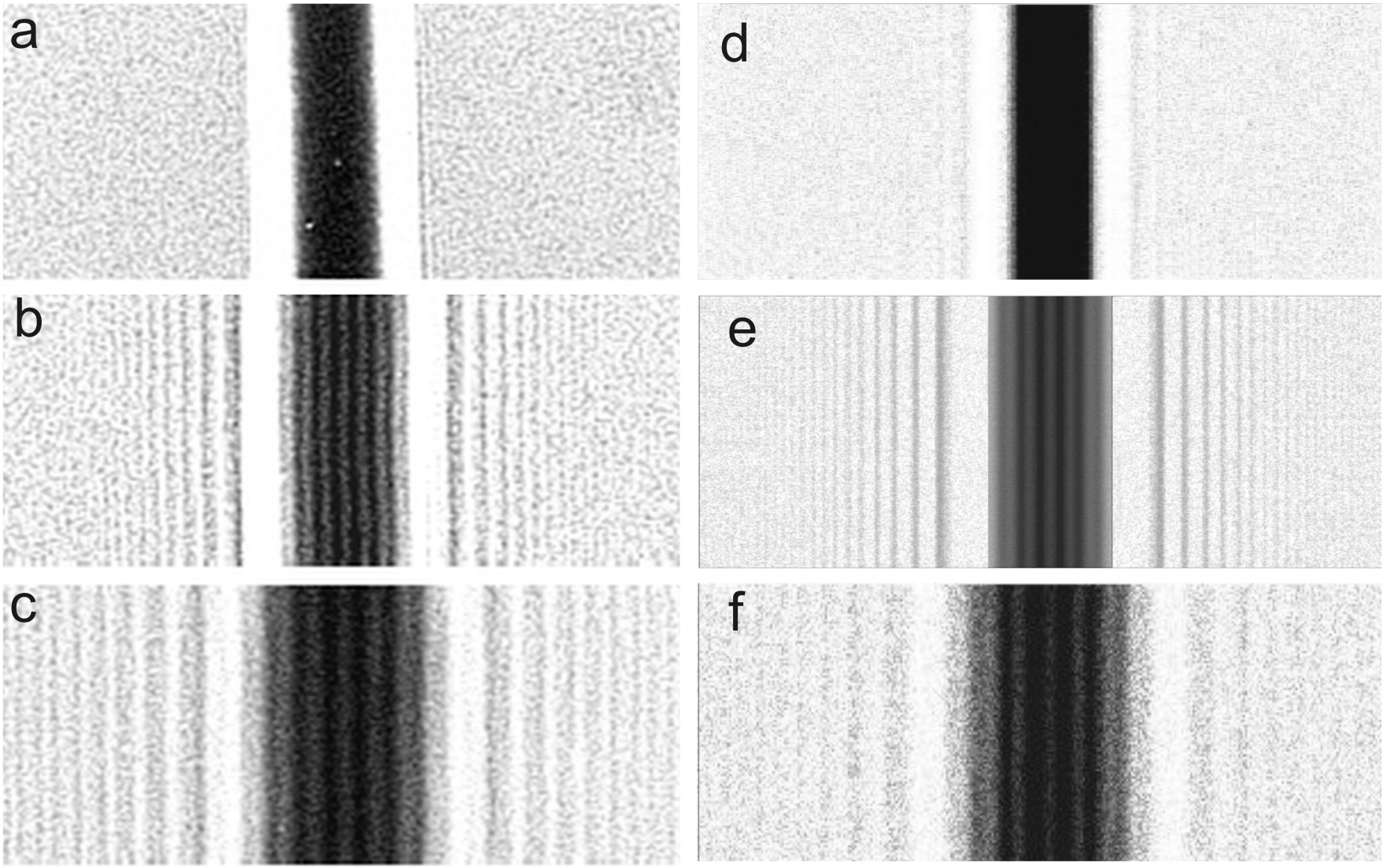
ESPERIMENTO DI GRIMALDI CON ELETTRONI



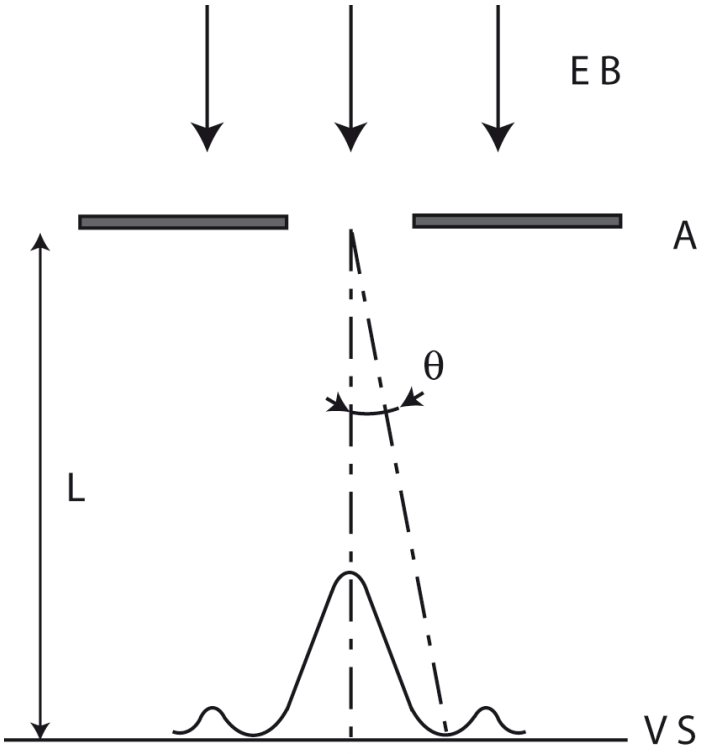
ESPERIMENTO DI GRIMALDI CON ELETTRONI – INTERFERENZA E DIFFRAZIONE DA UN FILO

RISULTATI SPERIMENTALI

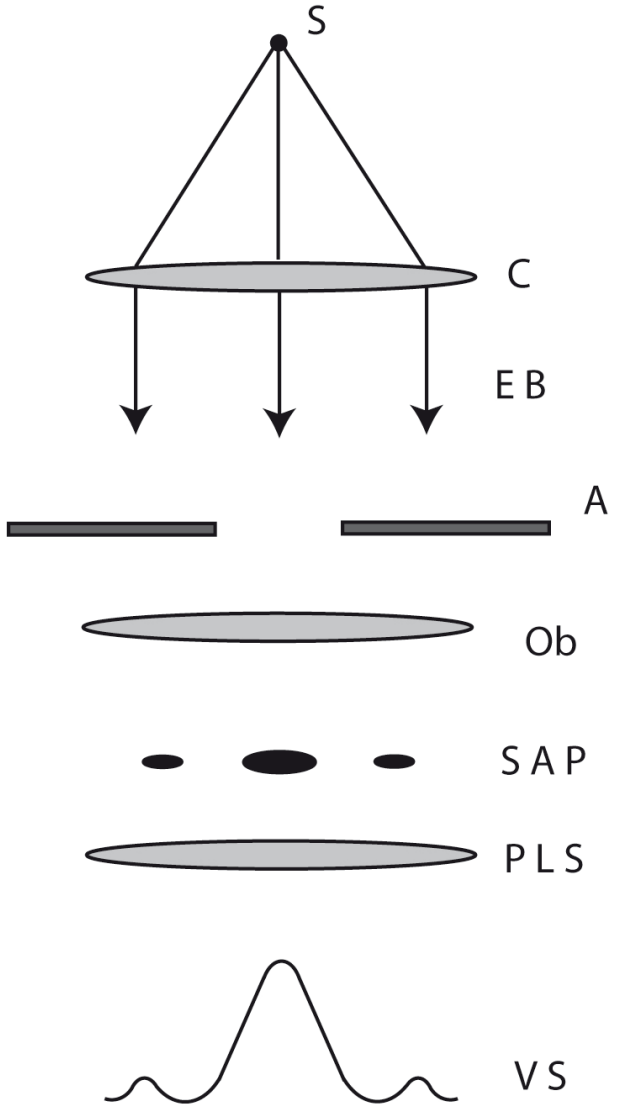
SIMULAZIONI



DIFFRAZIONE CON ELETTRONI

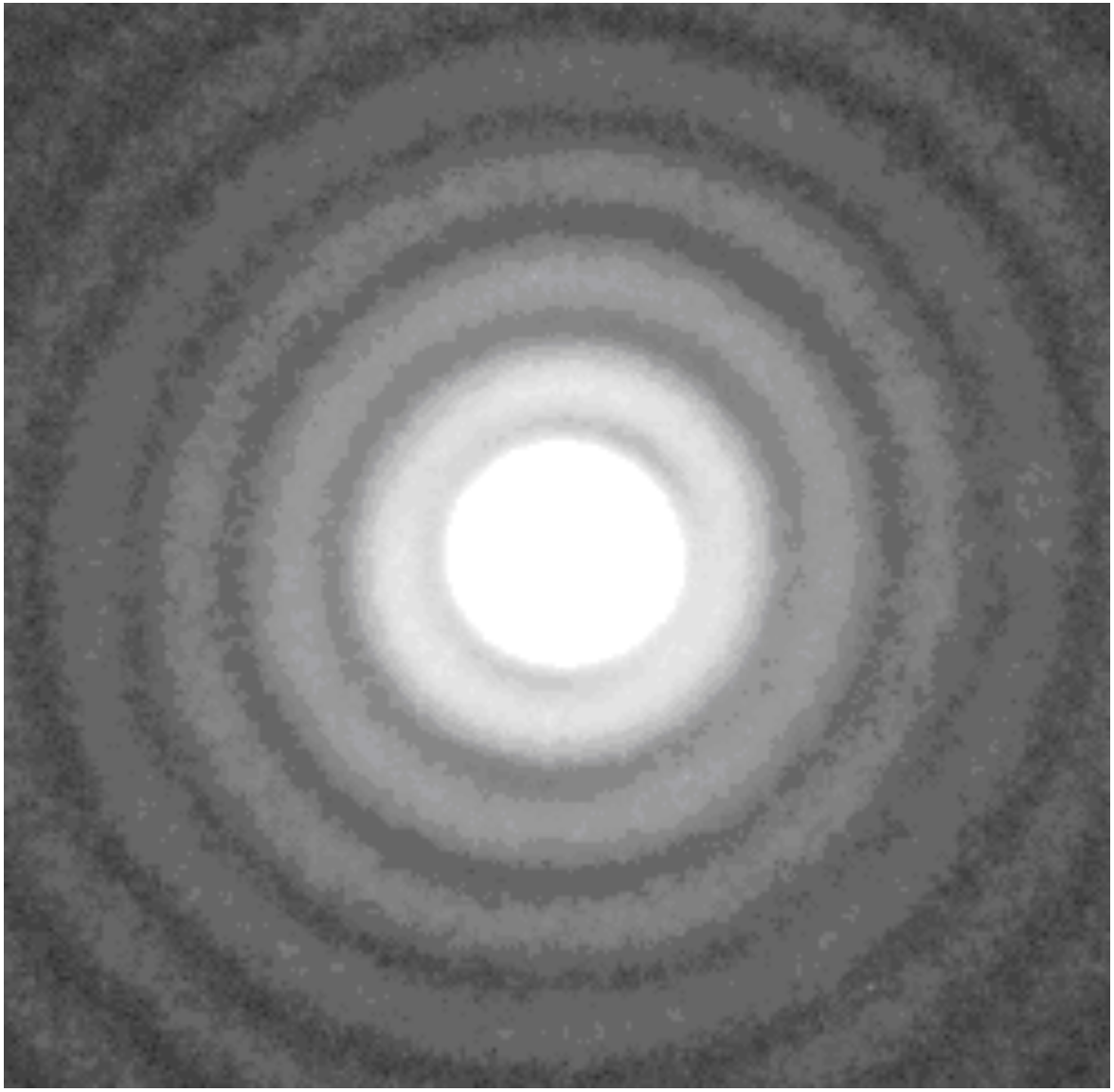


(a)

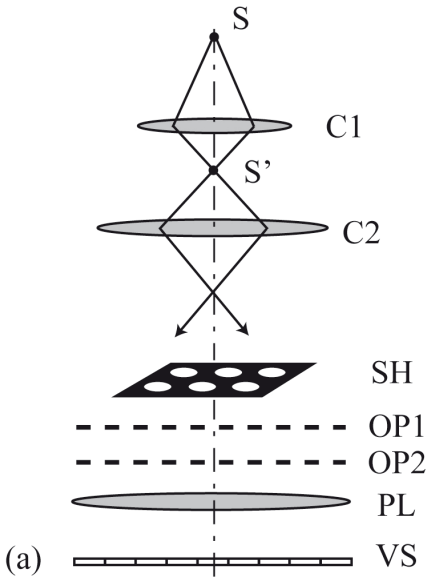


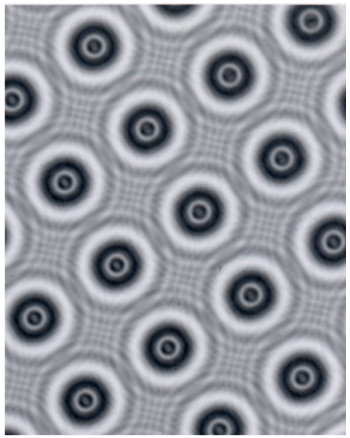
(b)

FIGURA DI DIFFRAZIONE CON ELETTRONI – FENDITURA CIRCOLARE



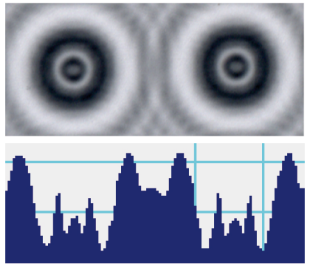
DIFFRAZIONE DI FRESNEL CON ELETTRONI - MOLTE FENDITURE



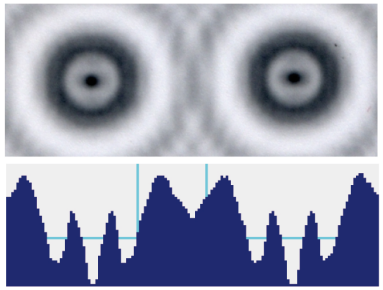


(b)

NUMERO DISPARI ZONE FRESNEL



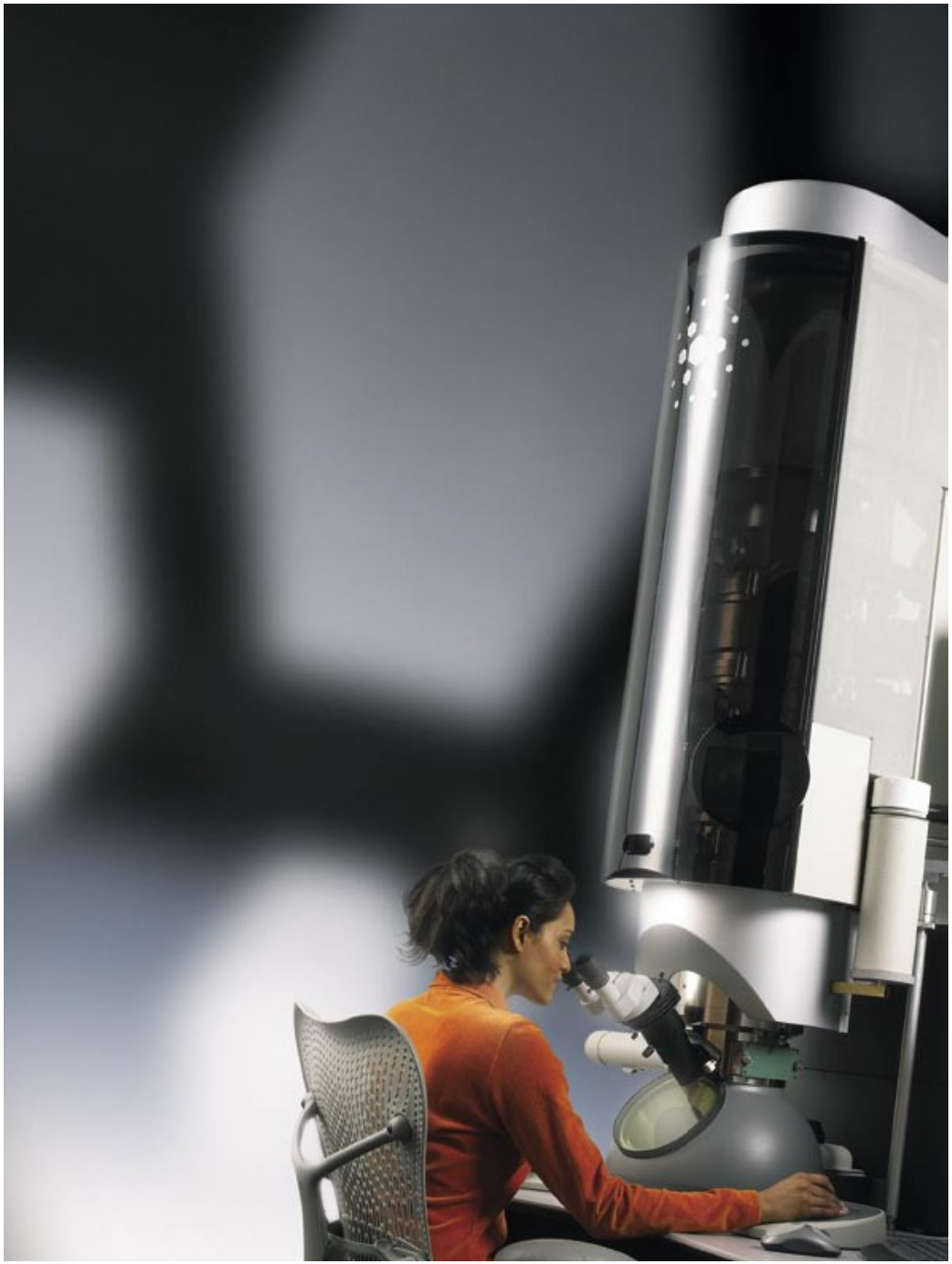
(c)



(d)

NUMERO PARI ZONE FRESNEL

MICROSCOPIO ELETTRONICO IN TRASMISSIONE - FEI



RETICOLO ATOMICO IN UN BORDO DI GRANO DELL'ORO