



Laboratorium badań dynamiki namagnesowania VNA-FMR i PIMM



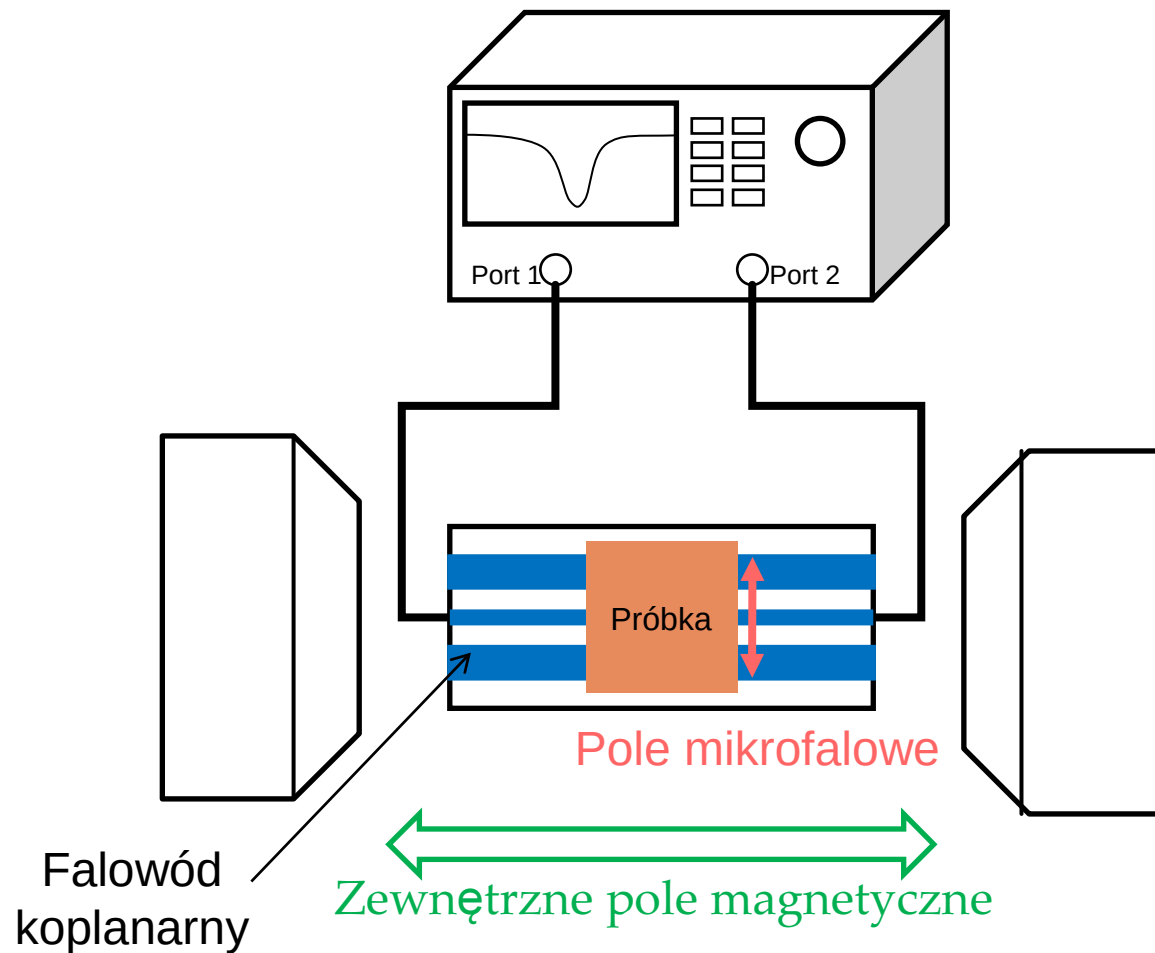
**INNOVATIVE
ECONOMY**

NATIONAL COHESION STRATEGY

**EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND**

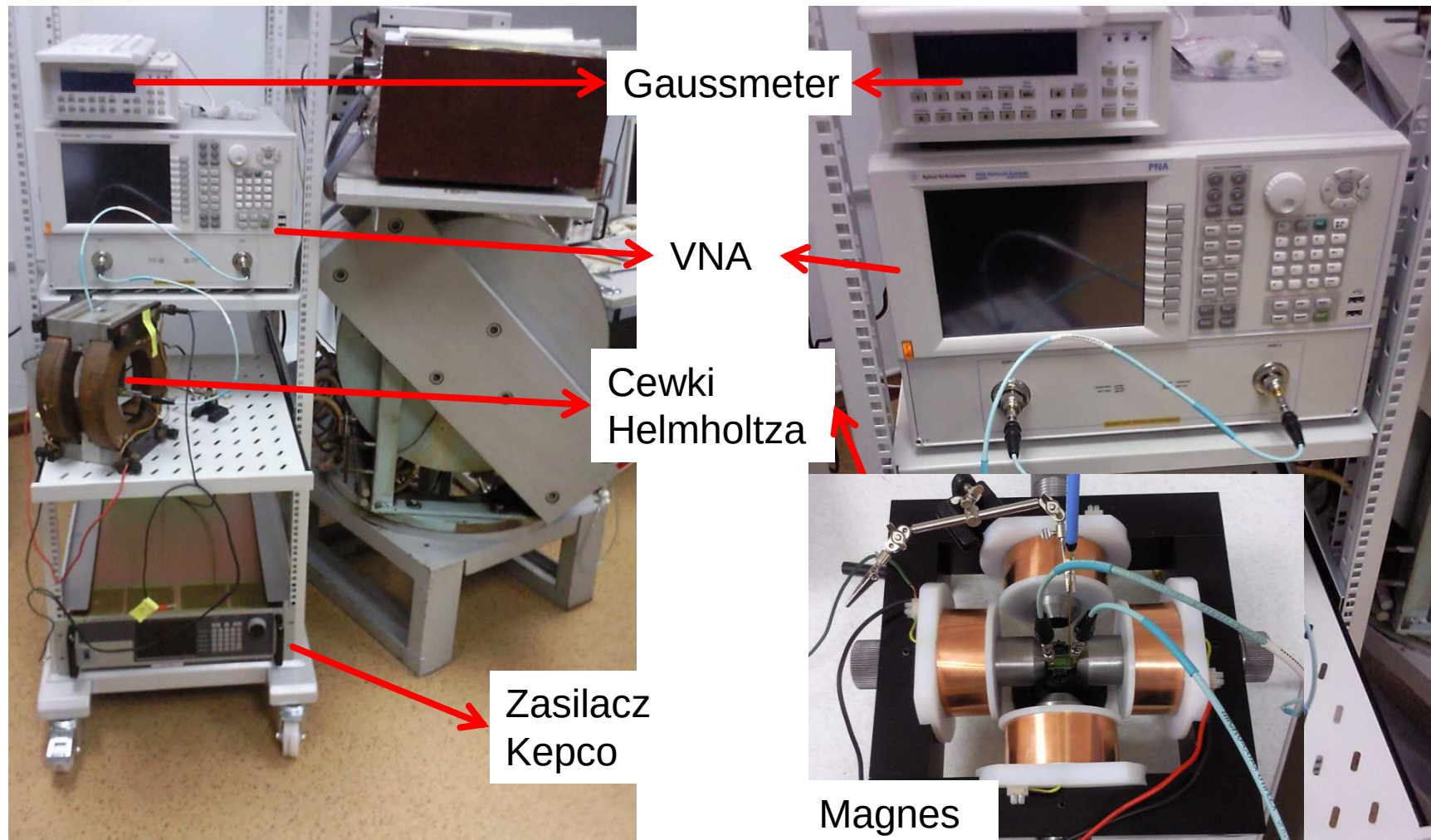


VNA-FMR

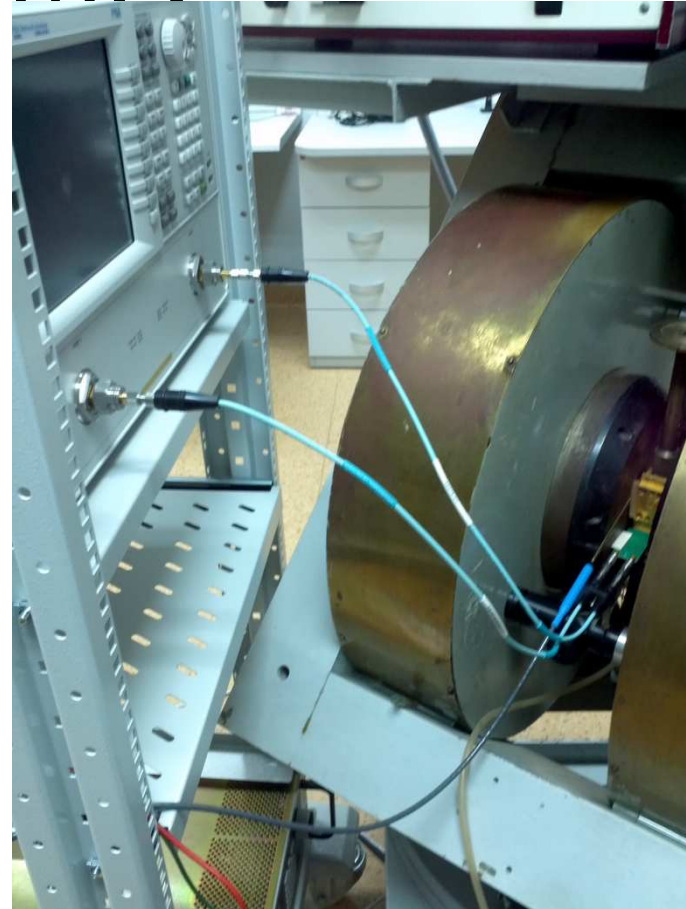
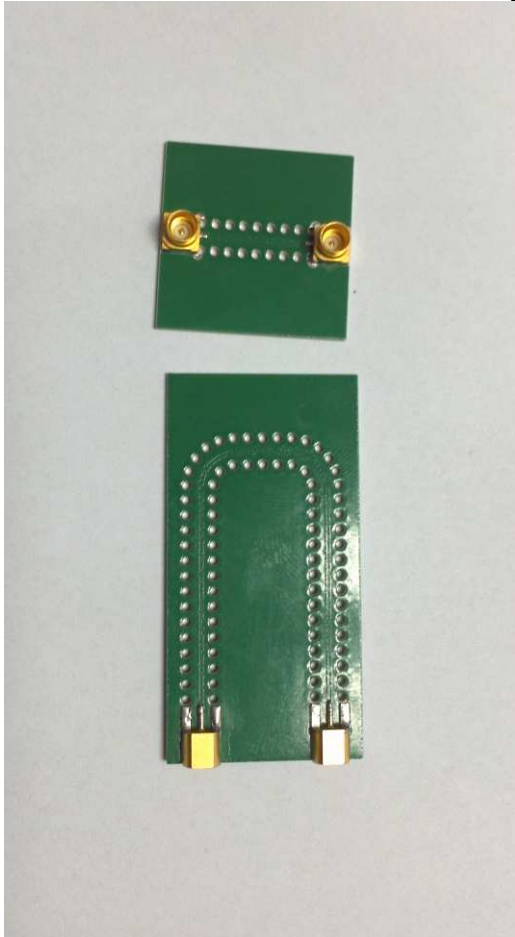


W rezonansie ferromagnetycznym z przemiataniem częstotliwości wektor namagnesowania nie zmienia swojego kierunku podczas pomiaru

VNA-FMR

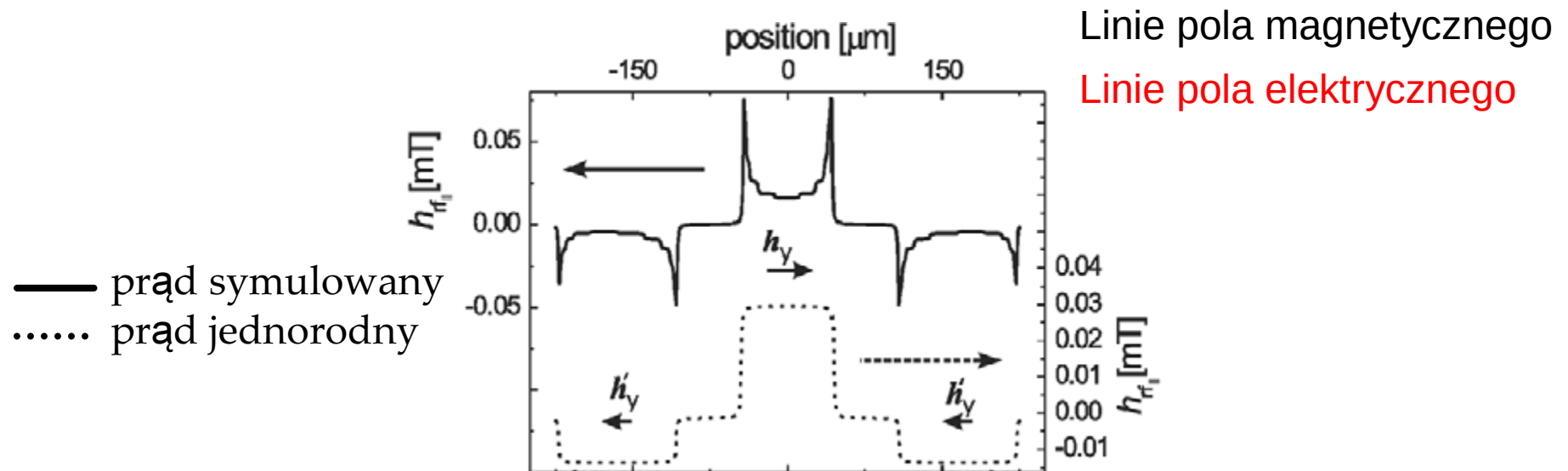
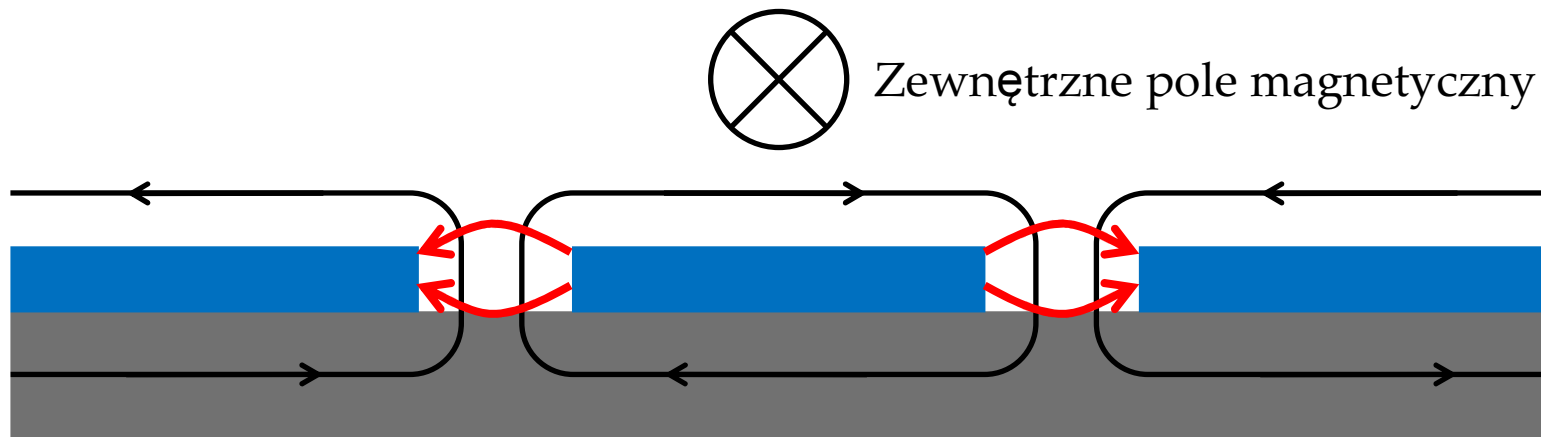


VNA-FMR



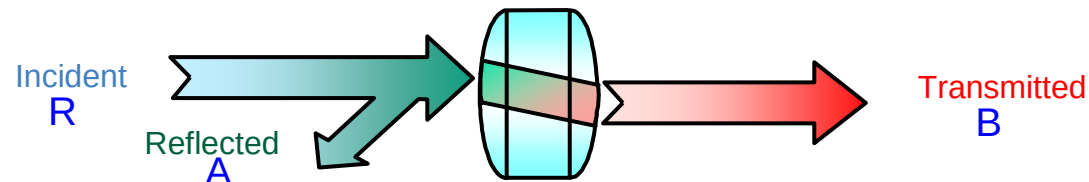
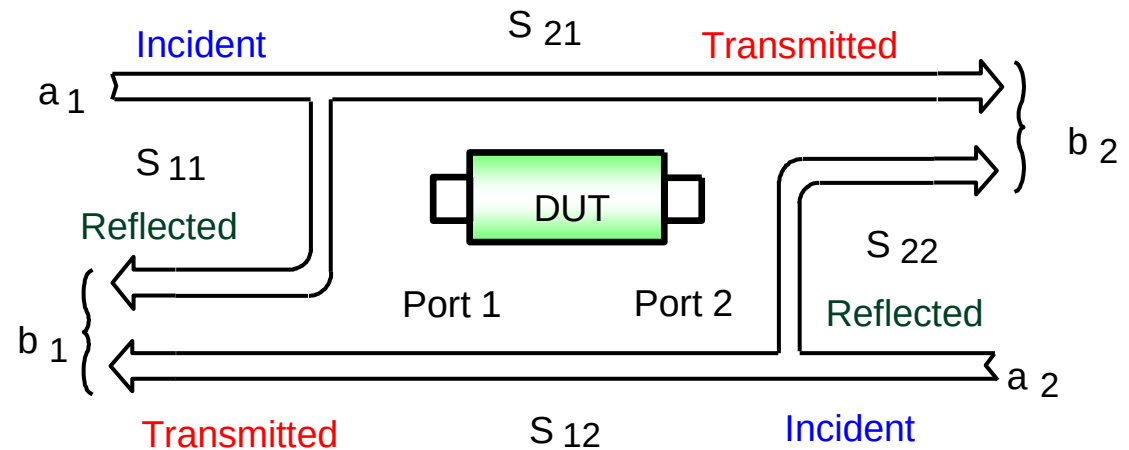
- New coplanar waveguide (CPW) – wider bandwidth up to 40 GHz
- Field sweeping mode

Falowod koplarnary



Parametry S

- Pomiary zmiany impedancji Z falowodu koplanarnego



$$b_1 = S_{11} a_1 + S_{12} a_2$$

$$b_2 = S_{21} a_1 + S_{22} a_2$$

REFLECTION

$$\frac{\text{Reflected}}{\text{Incident}} = \frac{A}{R}$$

Parameters associated with Reflection:

- SWR
- S-Parameters S_{11}, S_{22}
- Reflection Coefficient Γ, ρ
- Impedance, Admittance $R+jX, G+jB$
- Return Loss

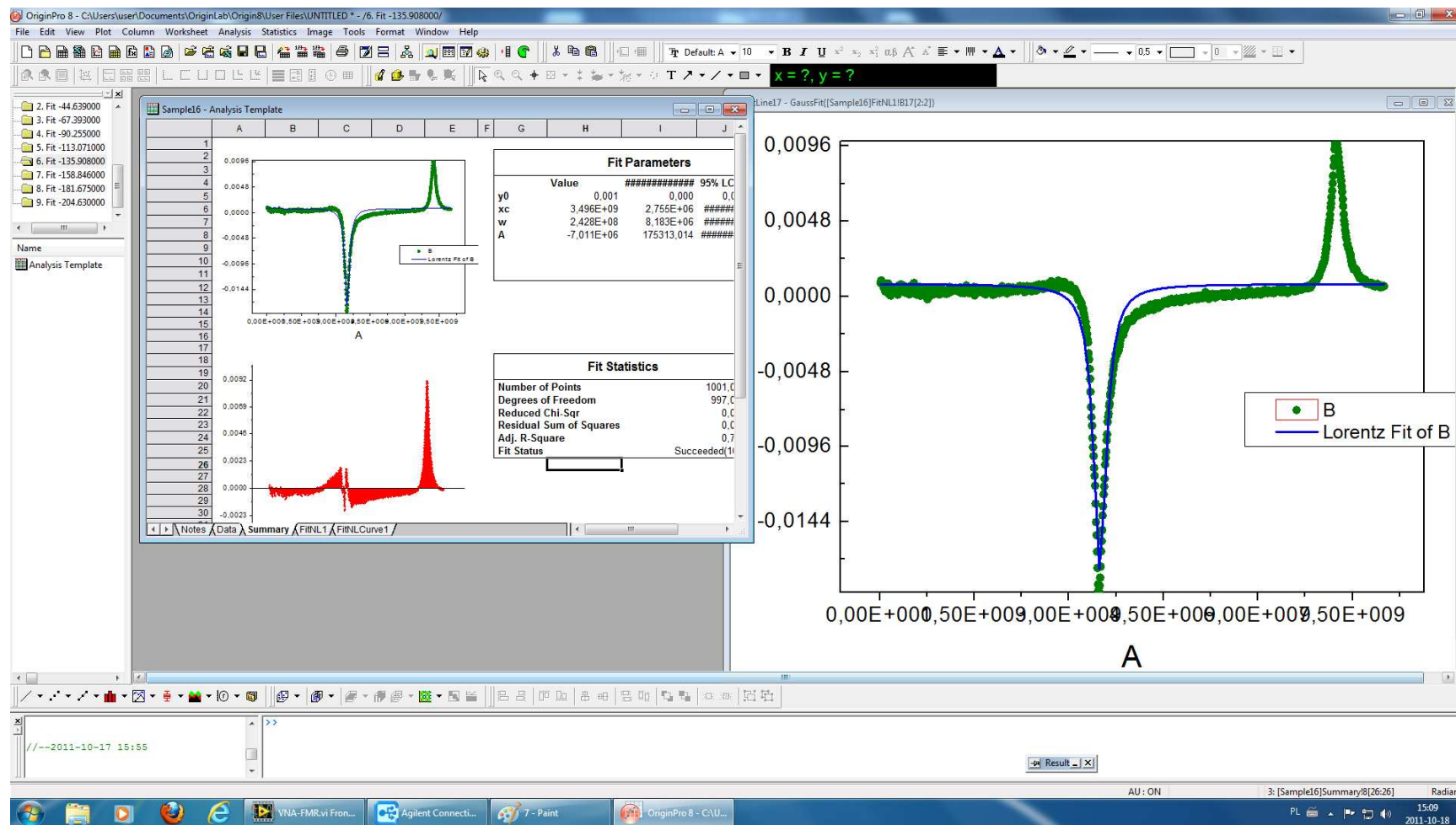
TRANSMISSION

$$\frac{\text{Transmitted}}{\text{Incident}} = \frac{B}{R}$$

Parameters associated with Transmission:

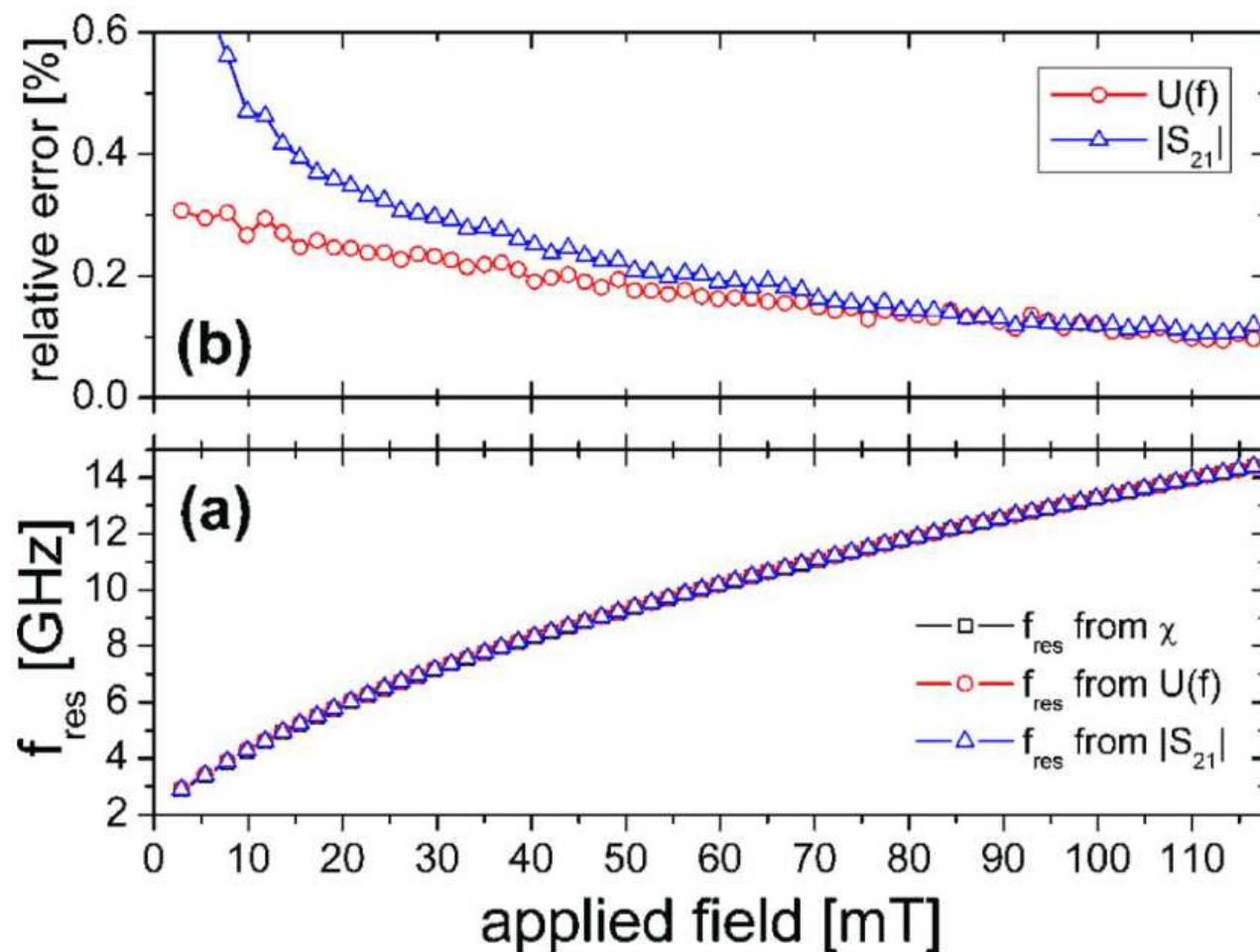
- Gain / Loss
- S-Parameters S_{21}, S_{12}
- Transmission Coefficient T, τ
- Insertion Phase
- Group Delay

Oprogramowanie VNA-FMR



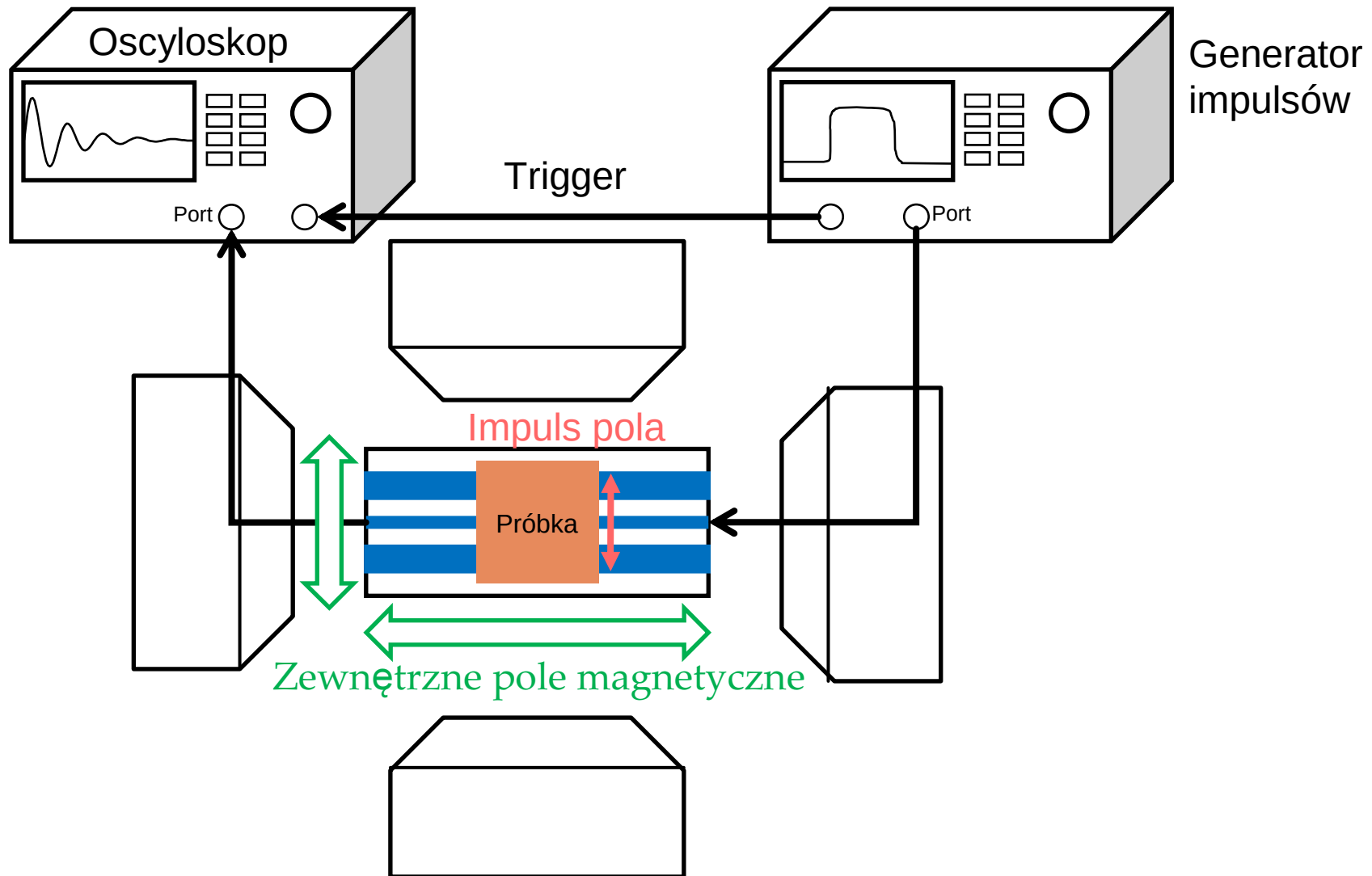
SiPy (30 nm)

Dokładność wyznaczenia częstotliwości rezonansowej



Porównanie różnych metod wyznaczania częstotliwości rezonansowej

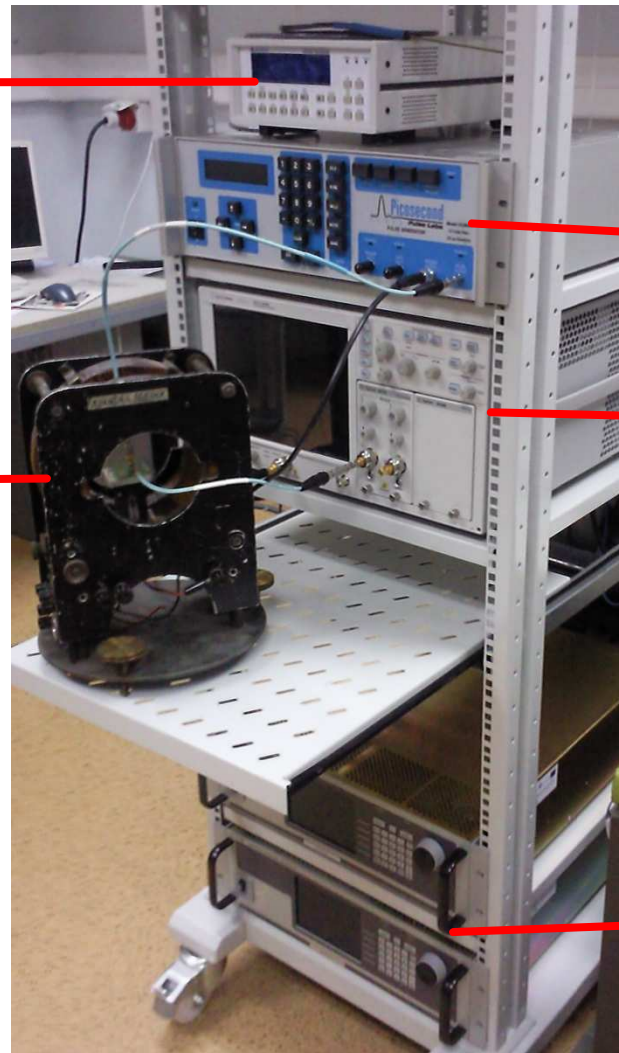
Pulsed inductive microwave magnetometer (PIMM)



PIMM

Gaussmeter

Cewki
Helmholtza

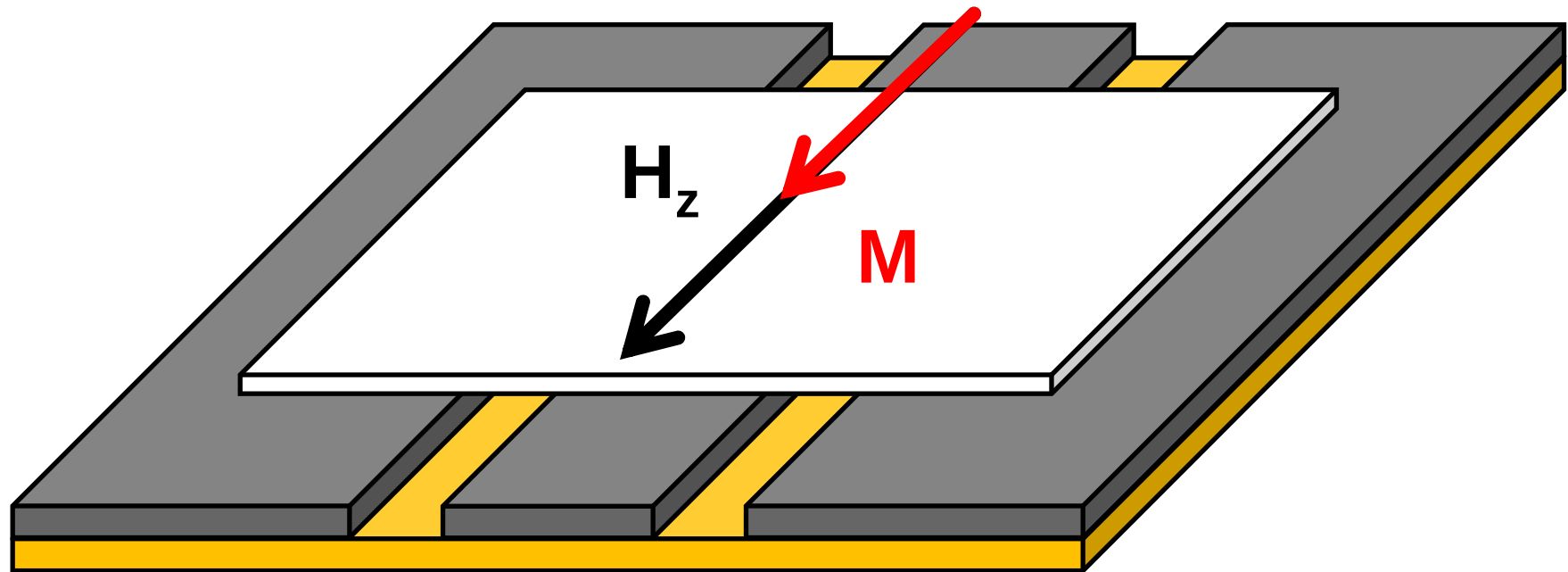


Generator
impulsów

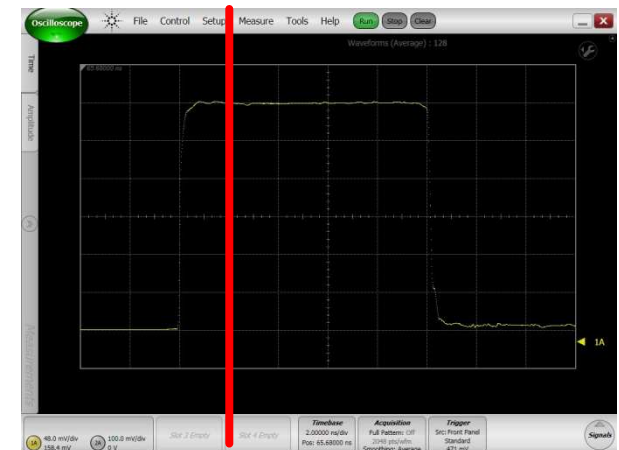
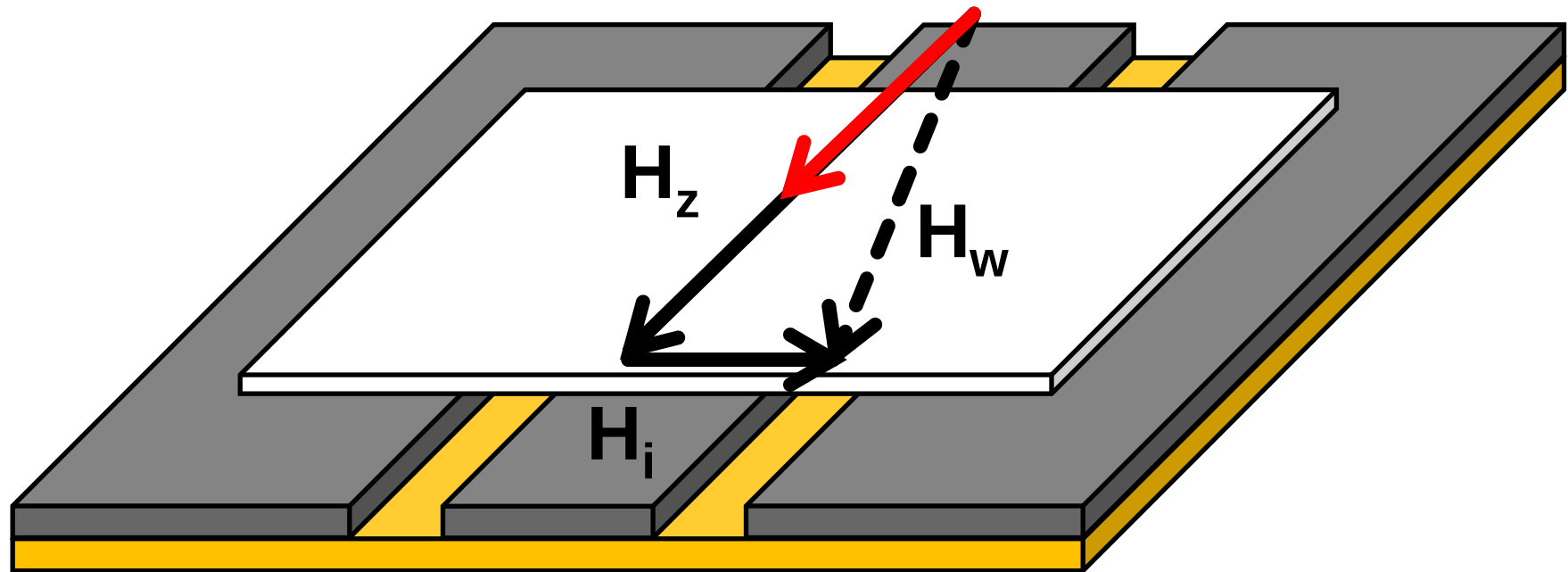
Oscyloskop

Zasilacz
Kepco

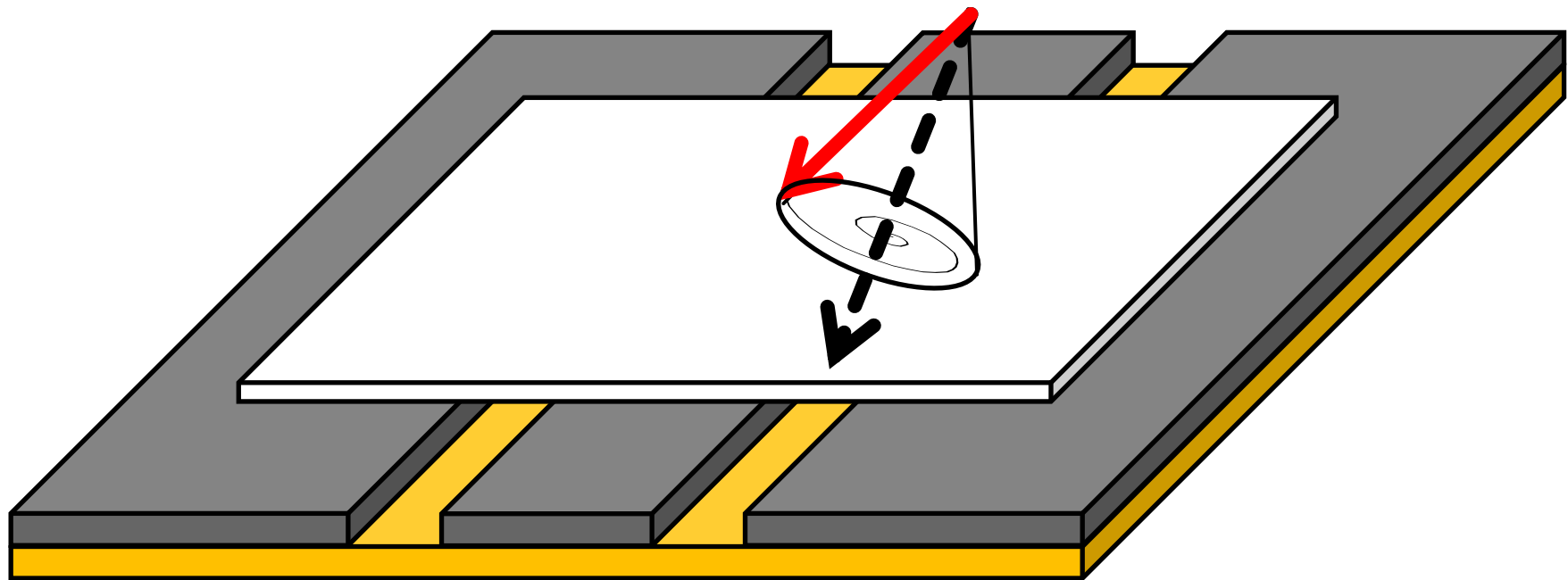
PIMM – pomiar



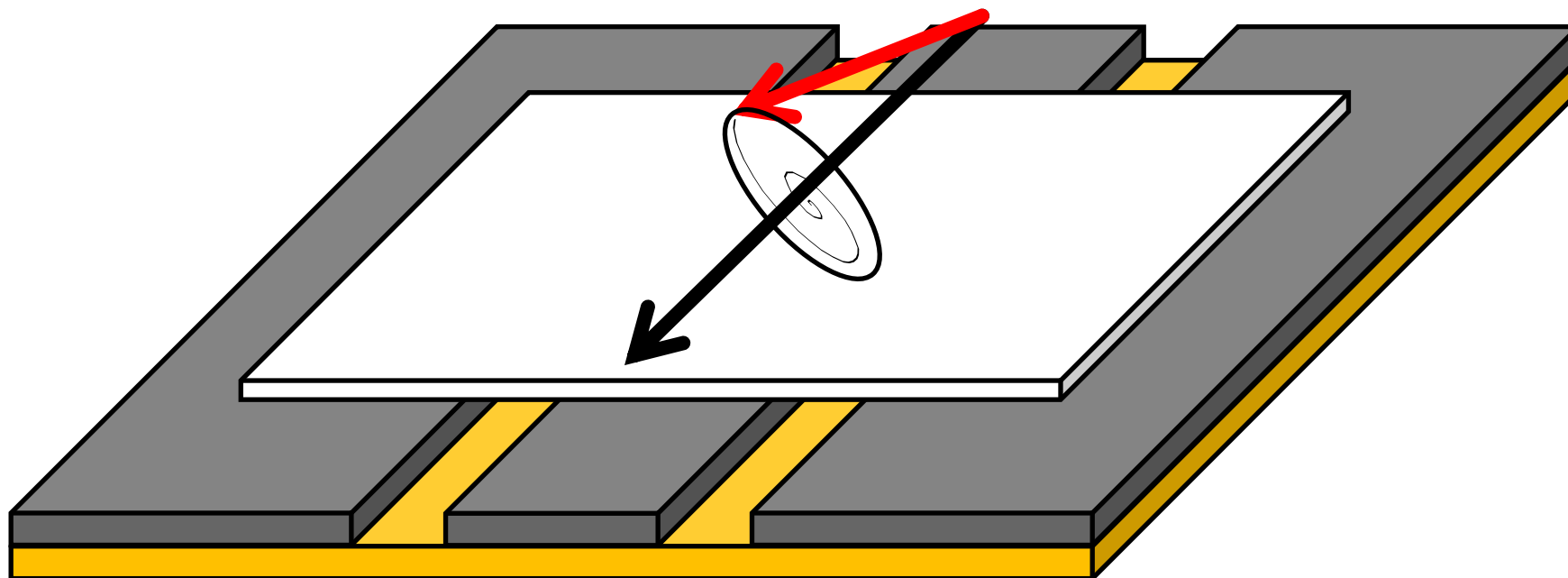
PIMM – pomiar



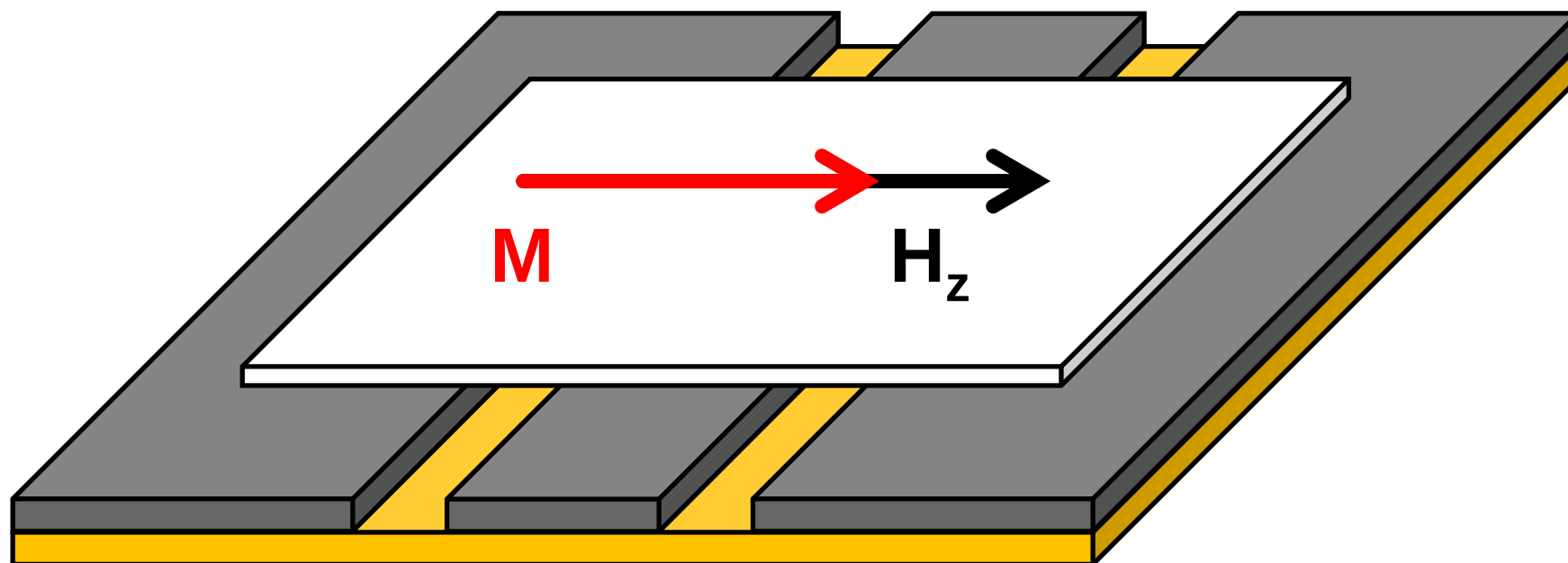
PIMM – pomiar



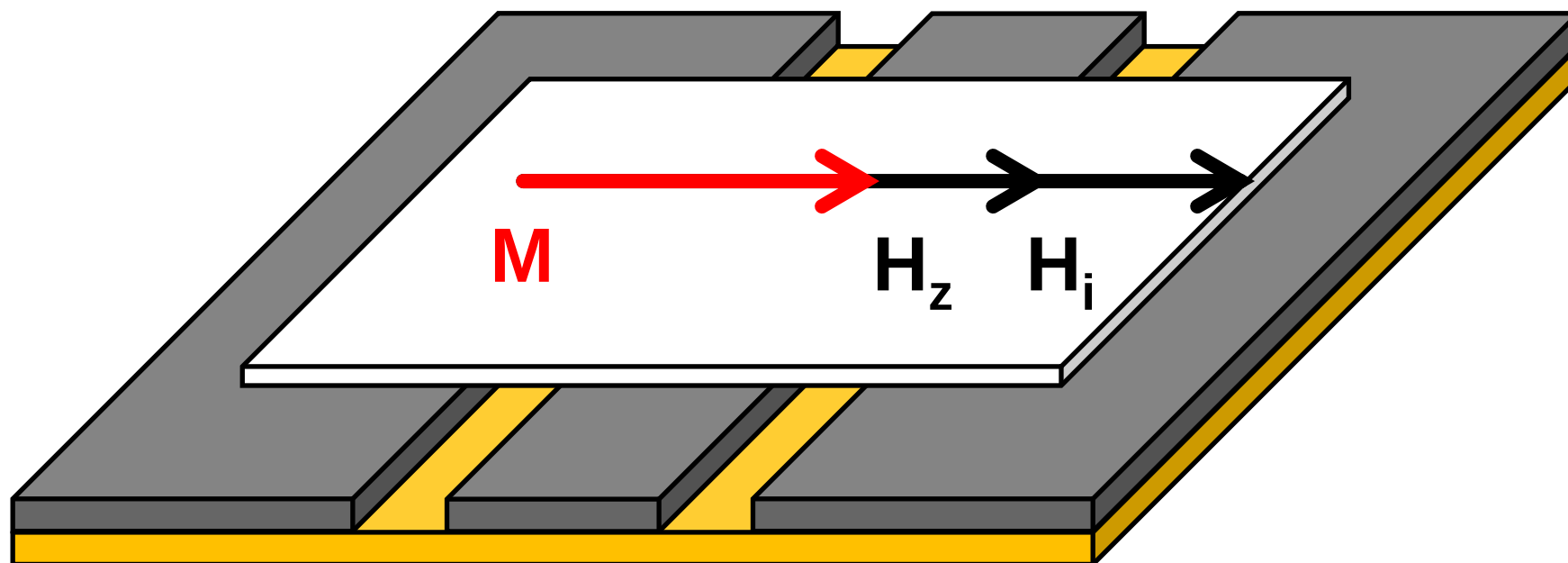
PIMM – pomiar



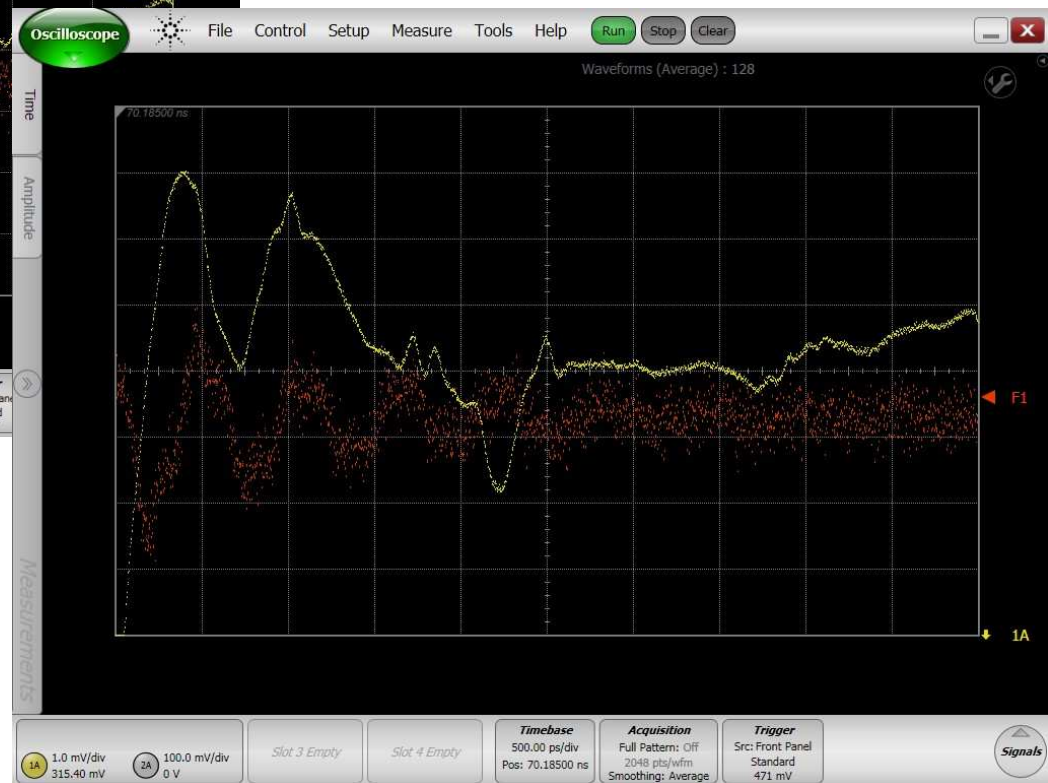
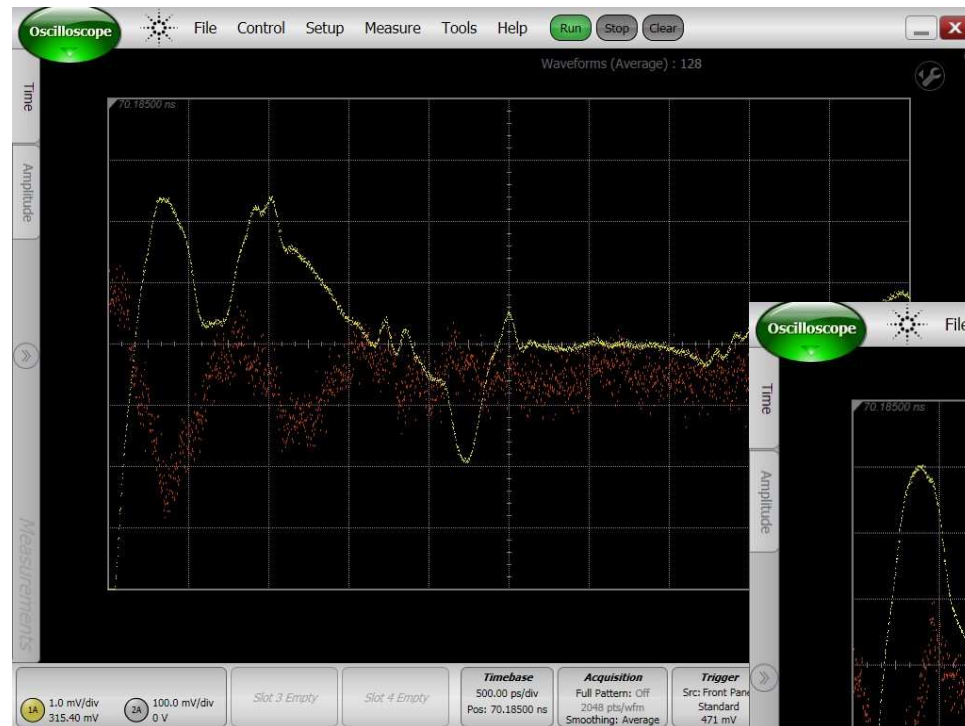
PIMM – pomiar referencyjny



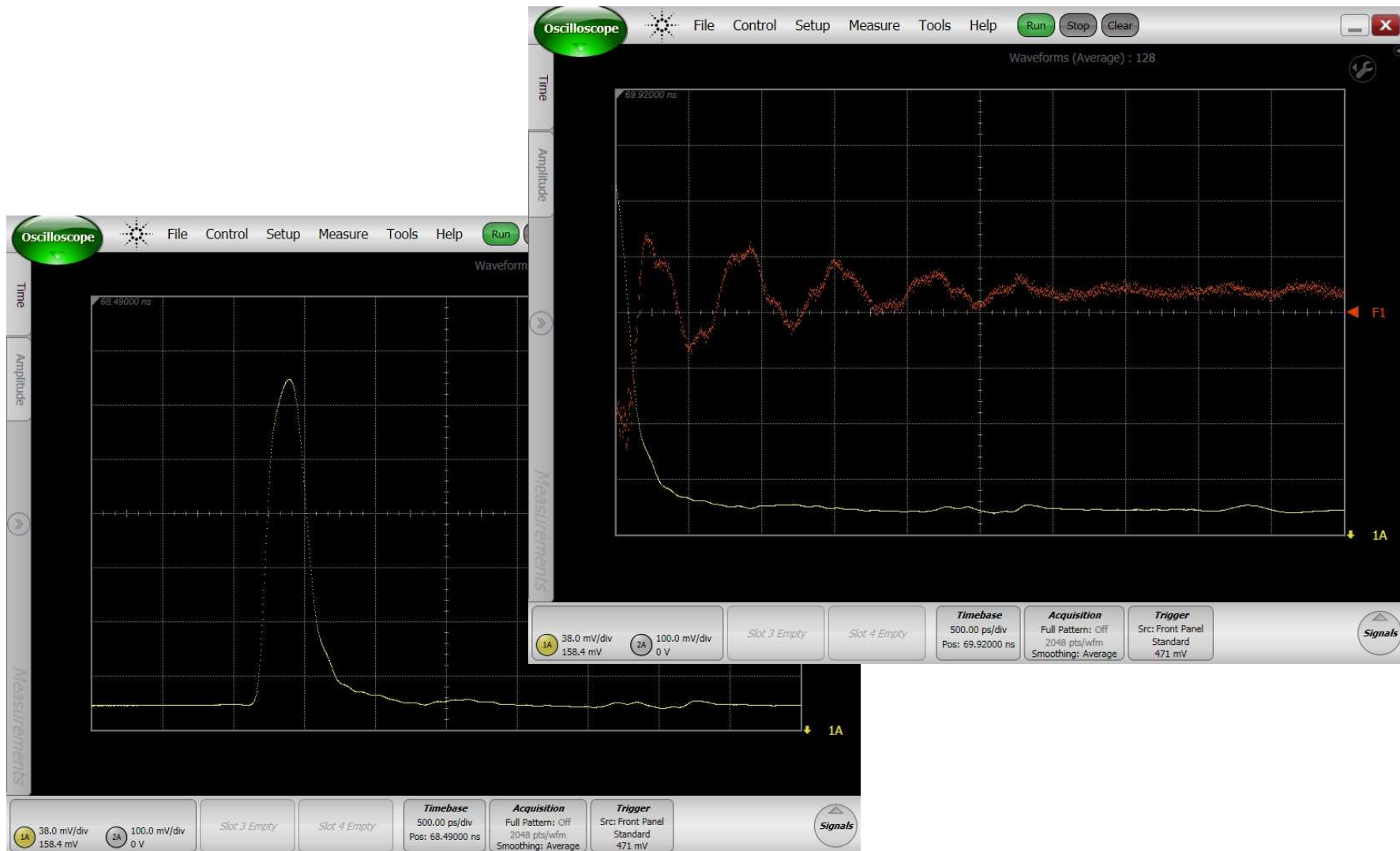
PIMM – pomiar referencyjny



PIMM – wynik odejmowania



PIMM – wynik odejmowania



Przykładowy pomiar VNA-FMR: epitaksjalna warstwa Co_2MnSn

