

MSE-213

Probability and statistics for materials science

Lecture 11

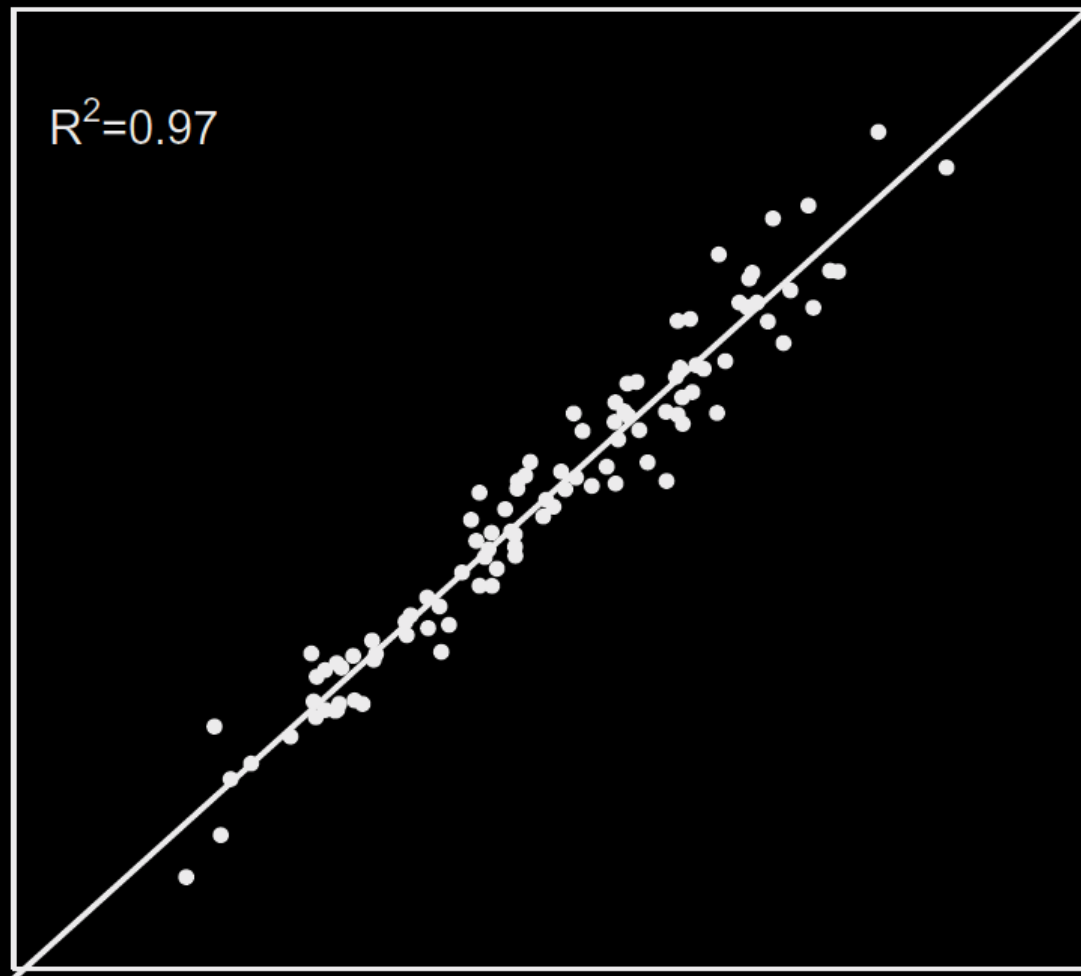


# ANOVA / F-test for linear regression with one slope

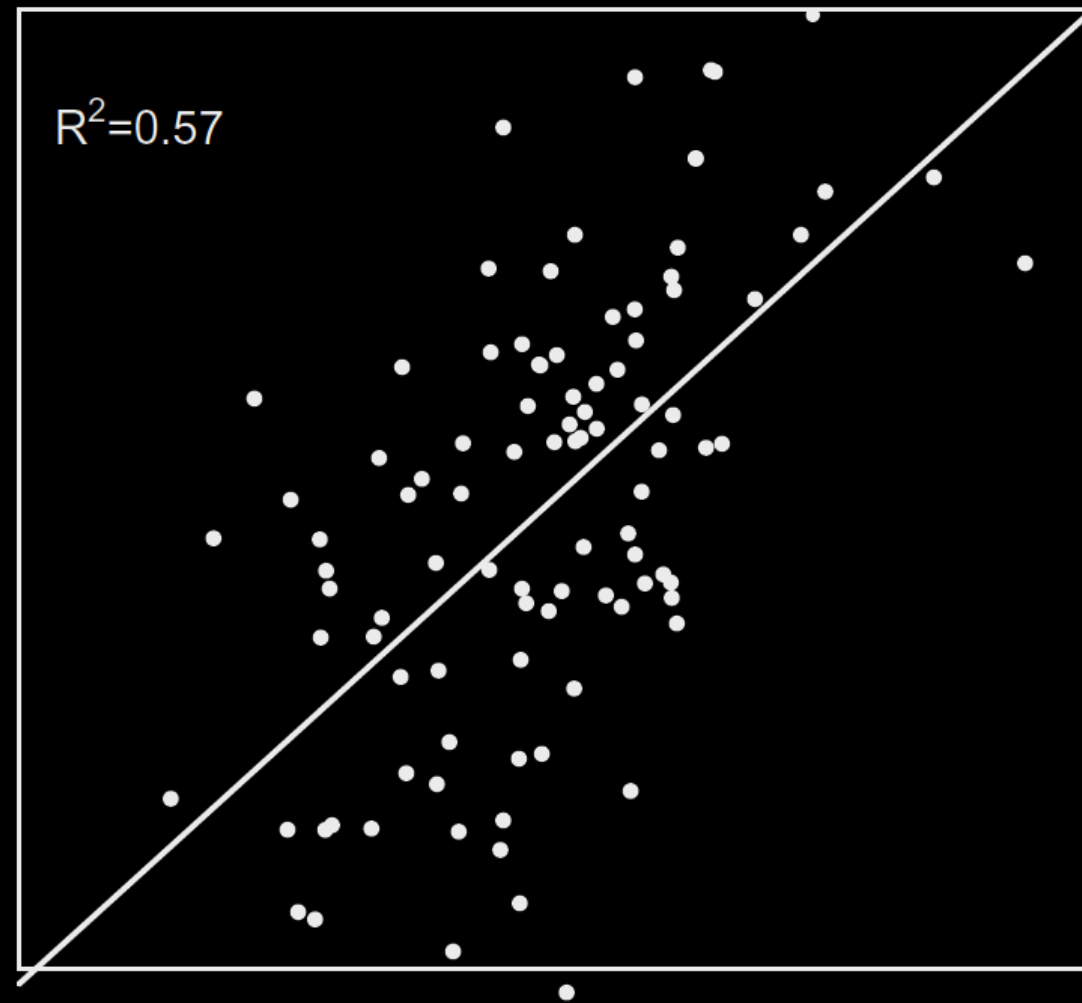
Source of Variation	Degrees of Freedom, $\nu$	Sum of Squares, $SS$	Mean square, $MS$	Fisher statistic, $F_{\text{MEASURED}}$
Model (with 1 slope)	1	$SS_M$	$SS_M/1$	$MS_M/MS_E$
Error within Residuals	$N_{ST}-2$	$SS_E$	$SS_E/(N_{ST}-2)$	
Total	$N_{ST}-1$	$SS_T$		

$SS_M$  sometimes called  $SS_R$  for "REGRESSION"

# Linear Regression – The $R^2$ “goodness of fit”

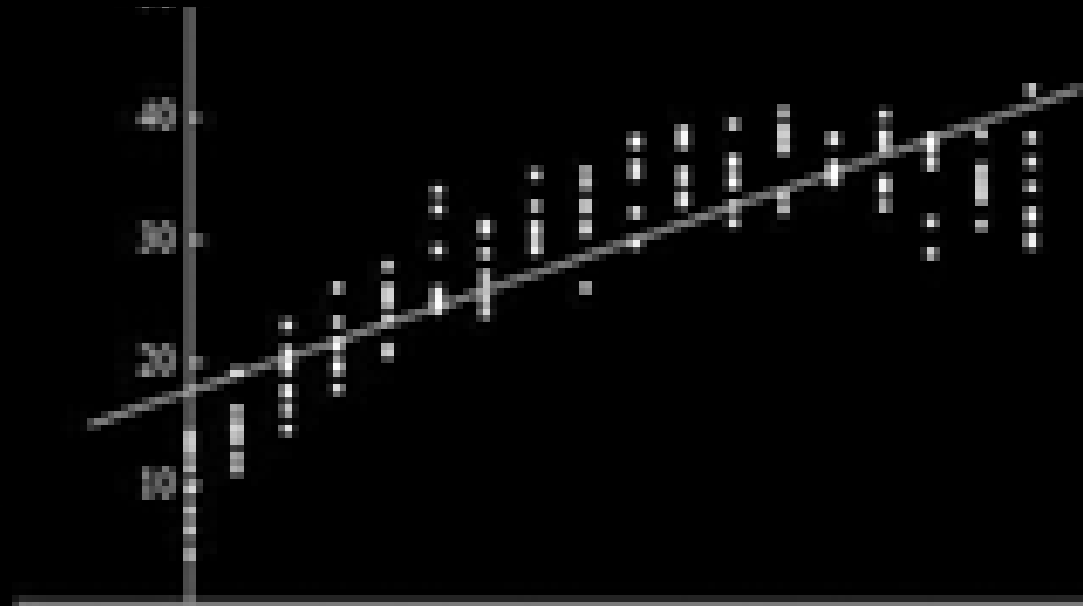
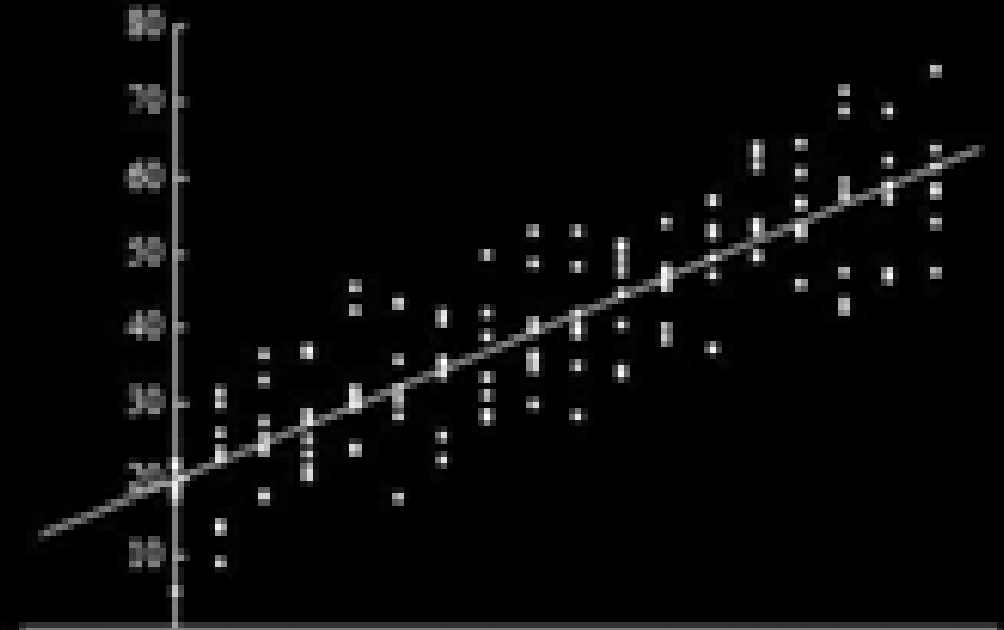
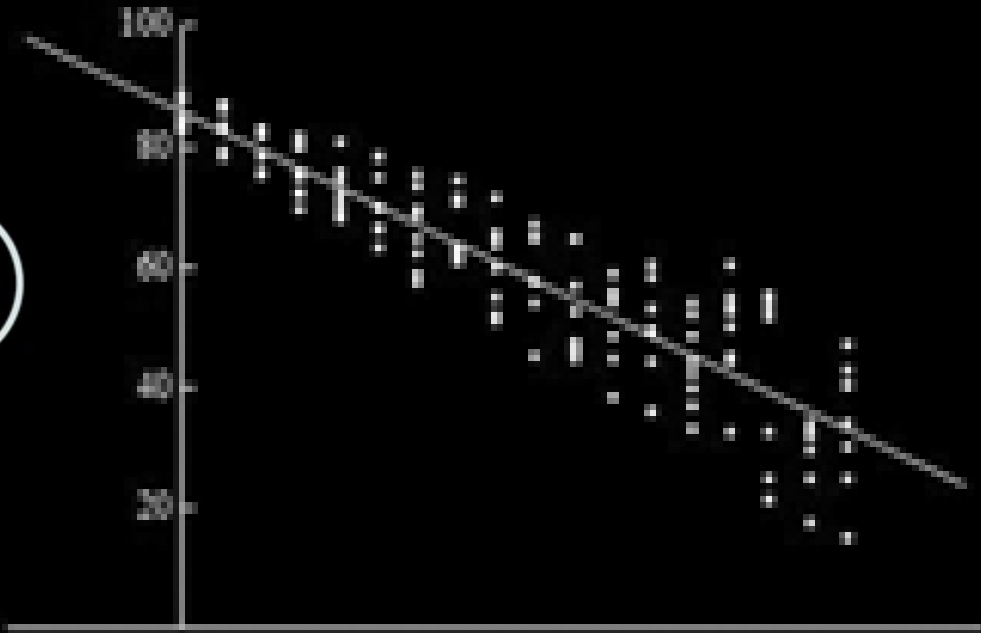


(a) Strong linear relationship

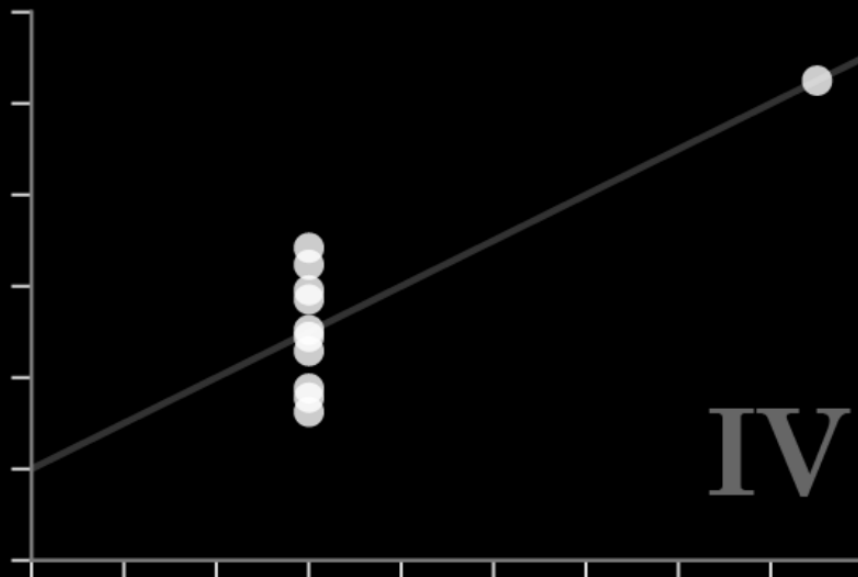
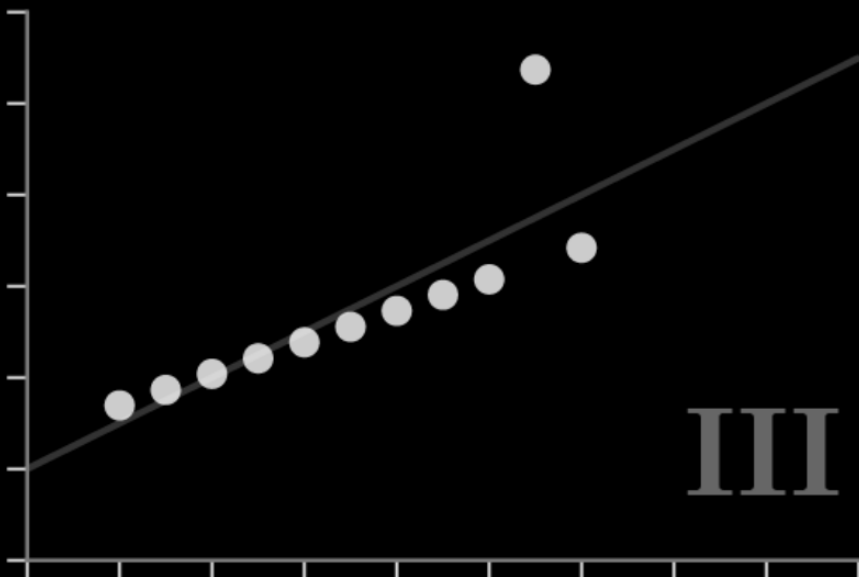
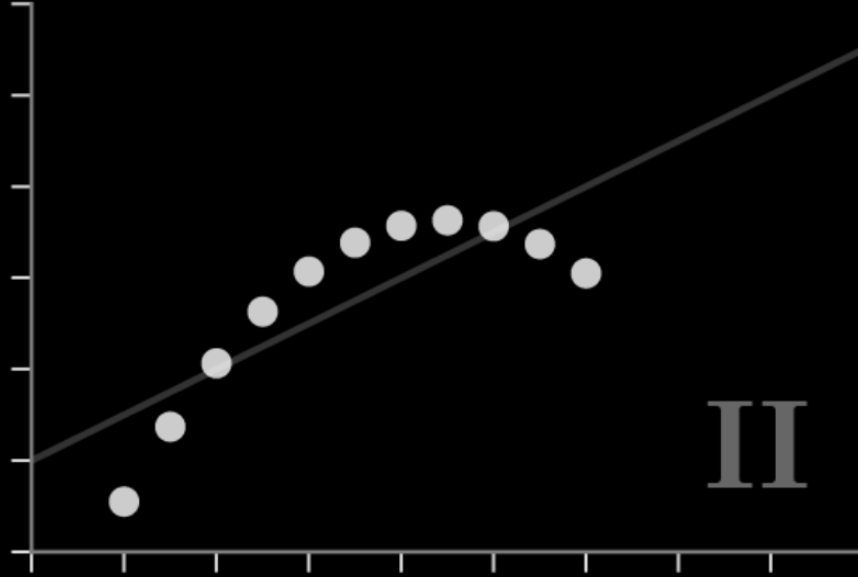
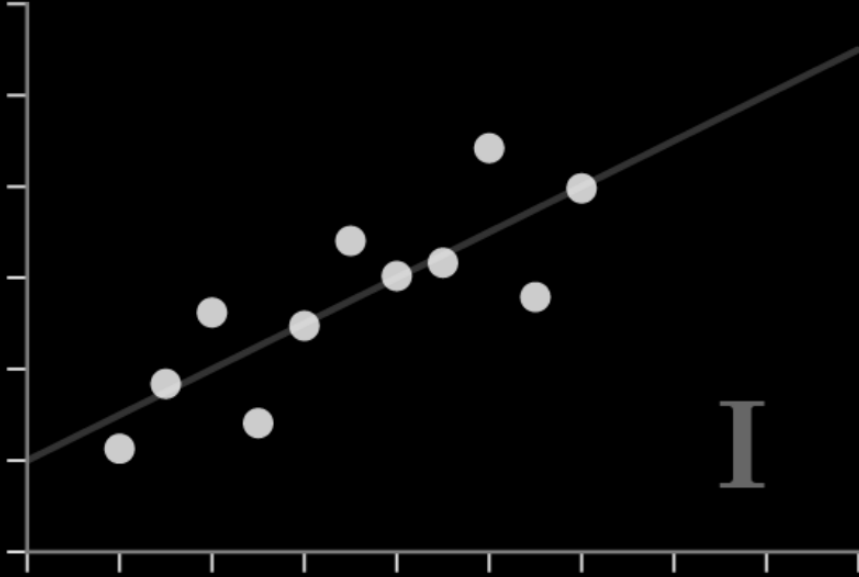


(b) Weak linear relationship

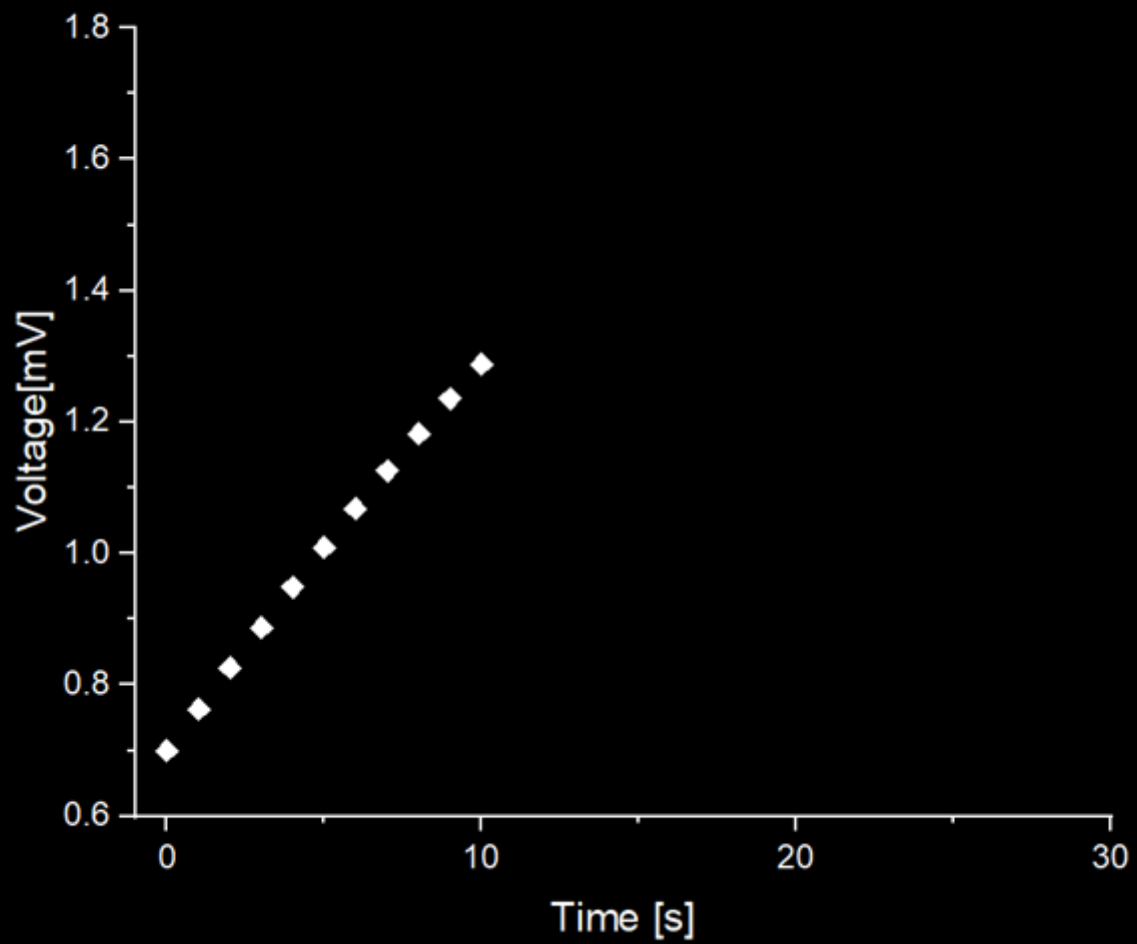
# Which data fulfil the criteria?

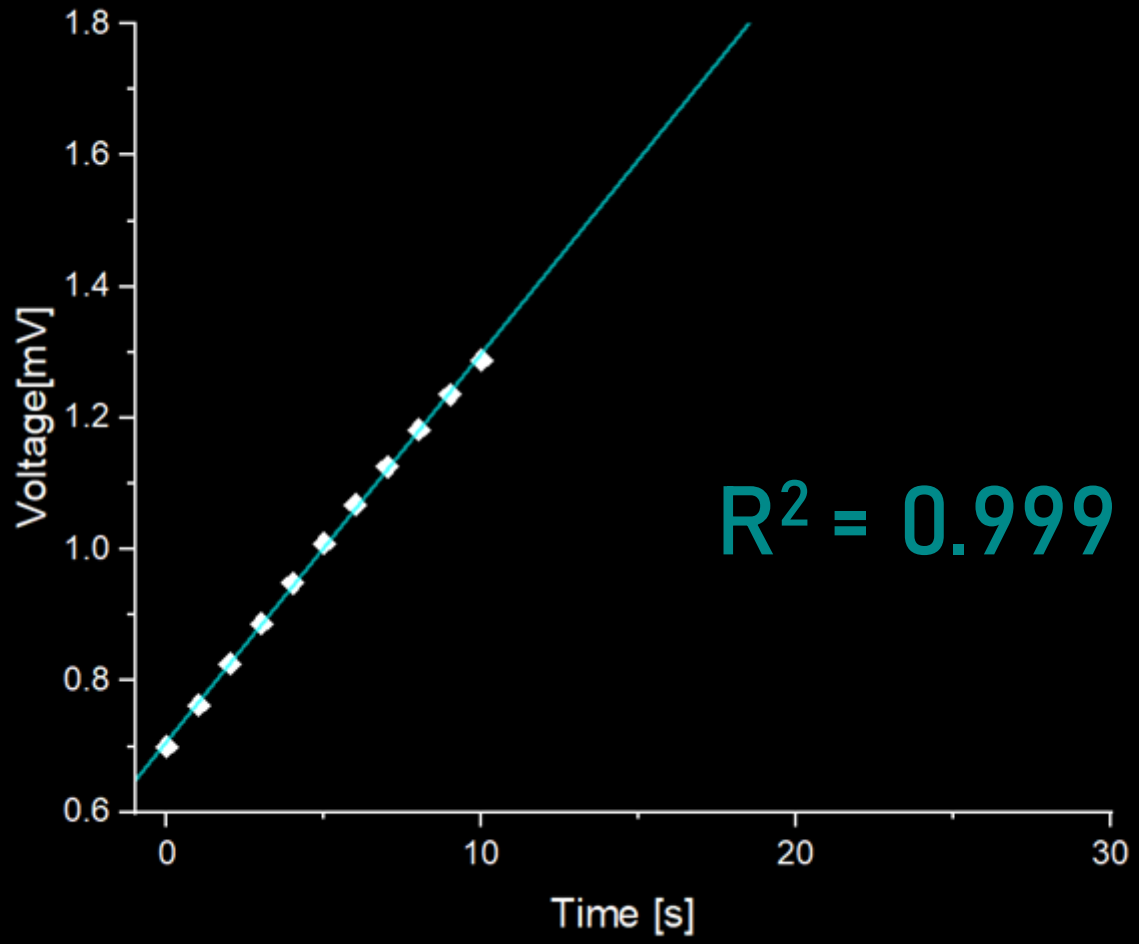


All  $R^2$  are 0.82 here

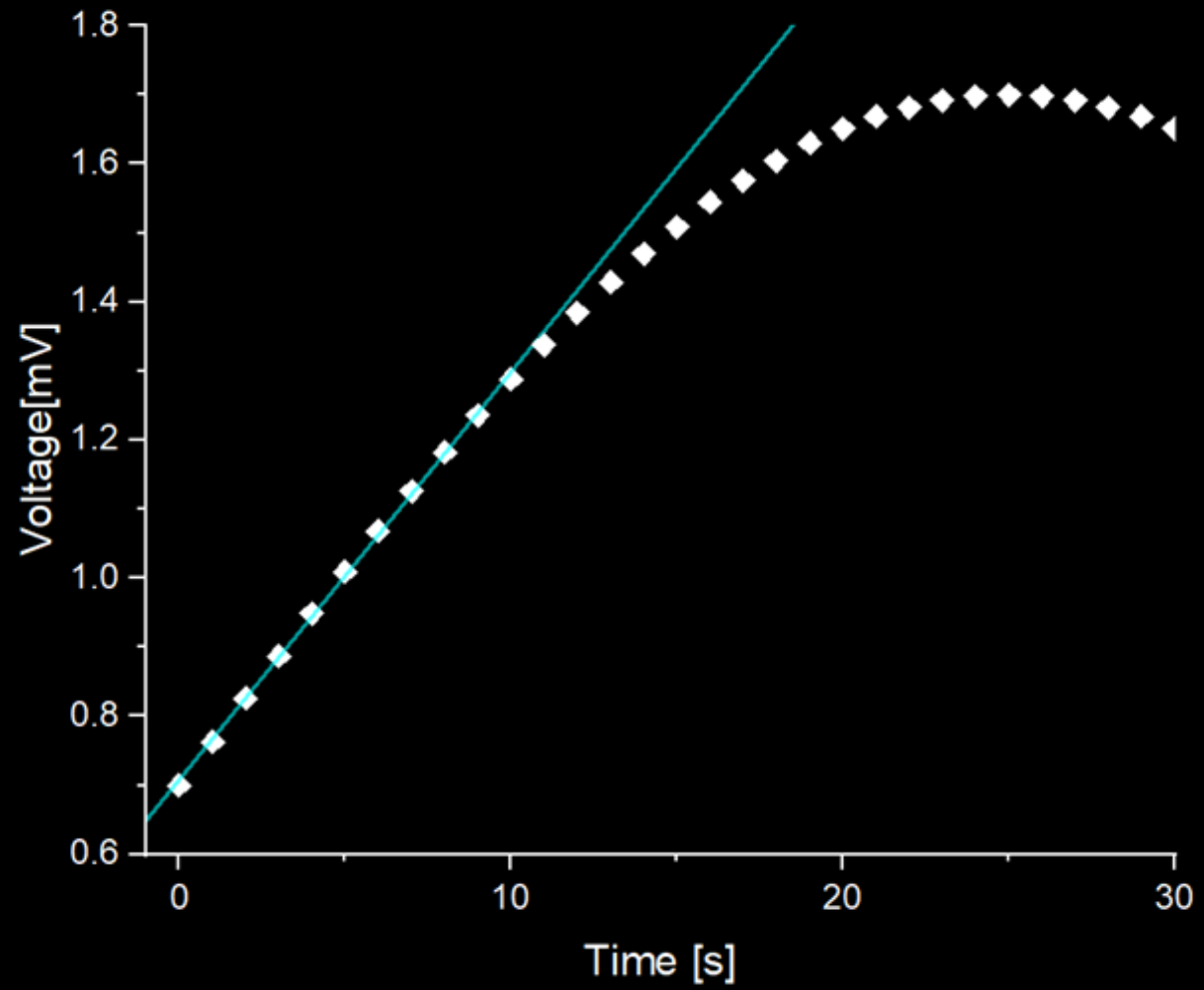


# Fitting data. A cautionary tale. Part I

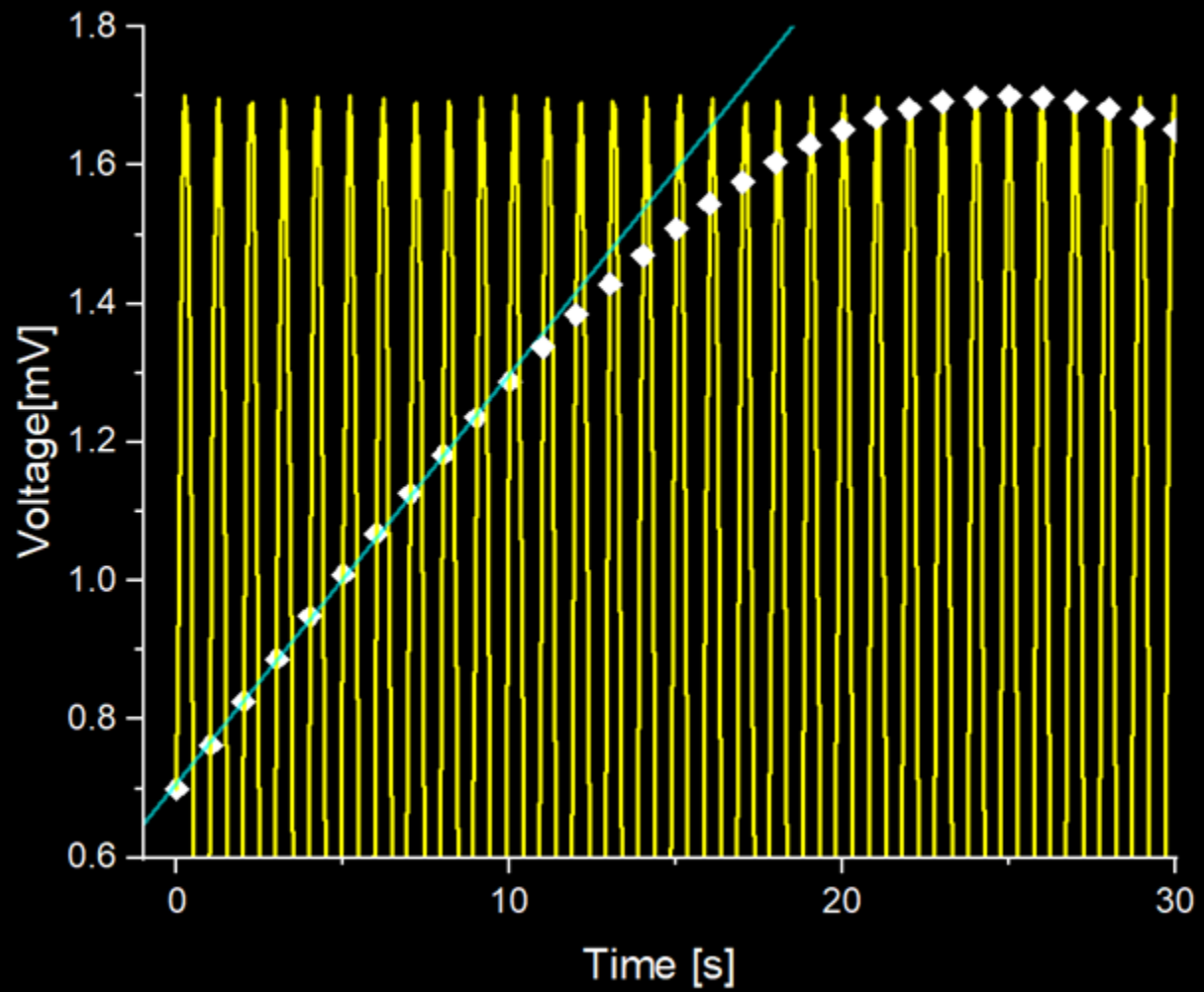




$R^2 = 0.999$

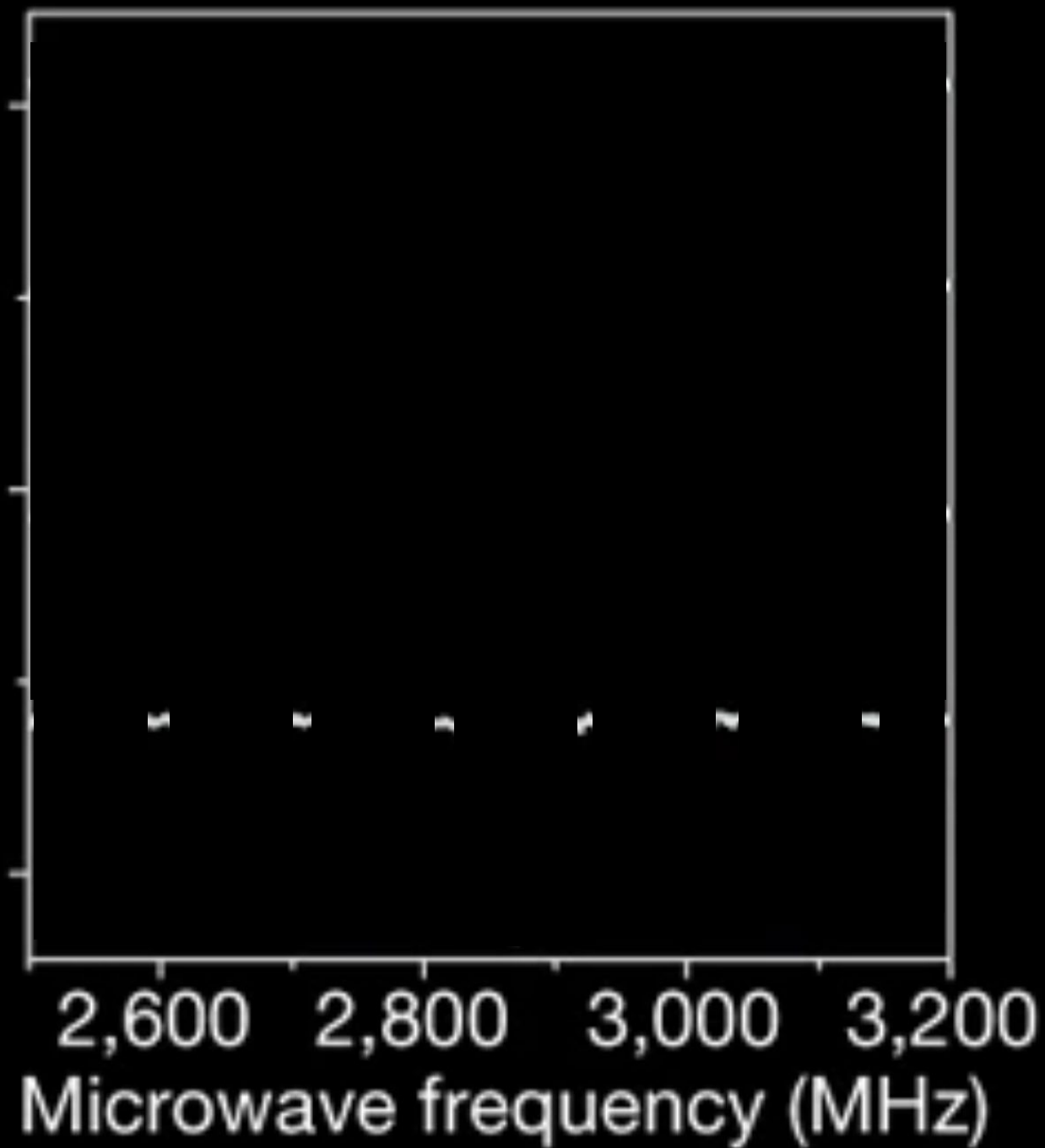


Only trust your fit...

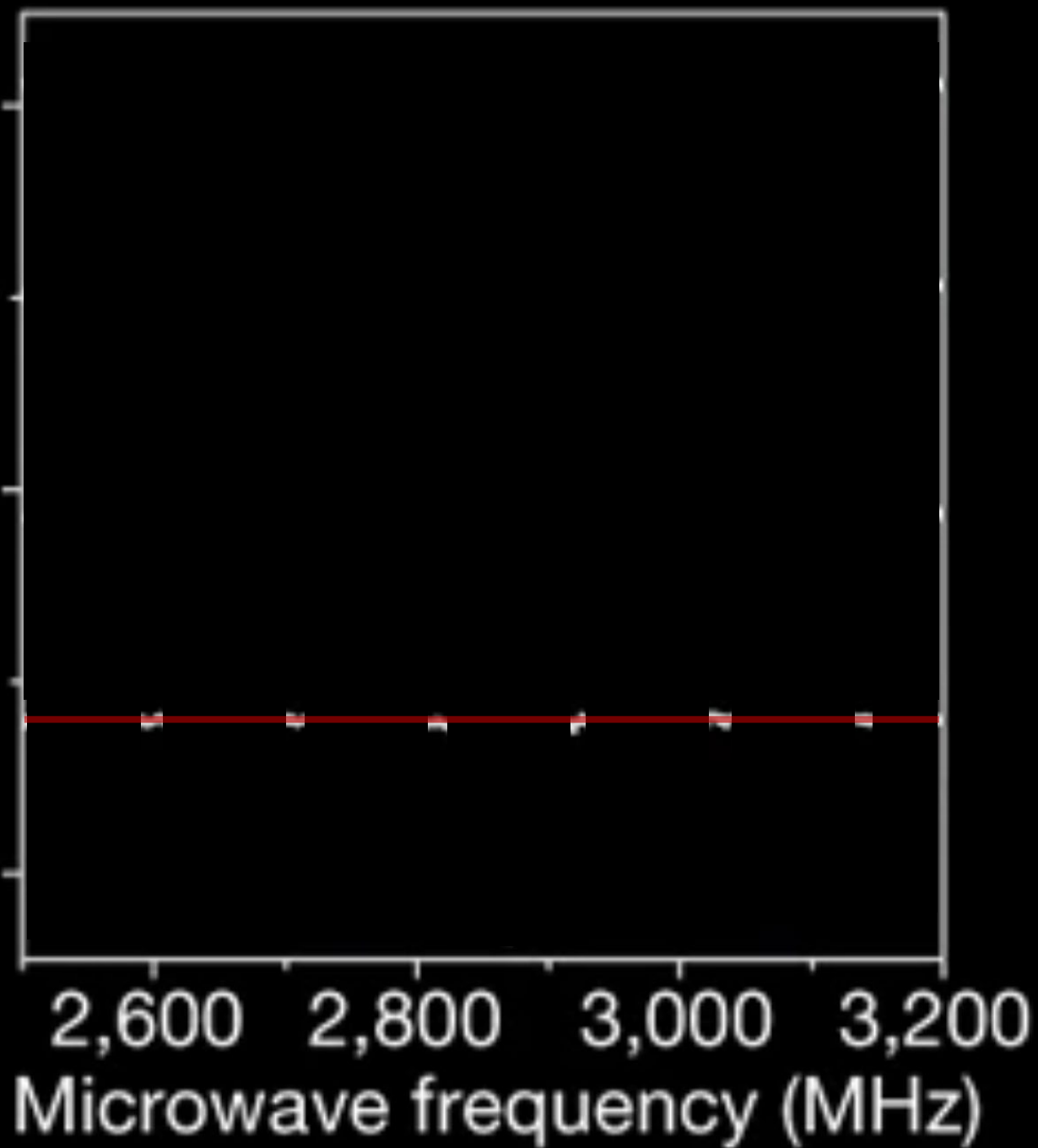


# Fitting data. A cautionary tale. Part II

Fluorescence (a.u.)



Fluorescence (a.u.)



Fluorescence (a.u.)

