

# An all optical system for studying temperature induced changes in diamond

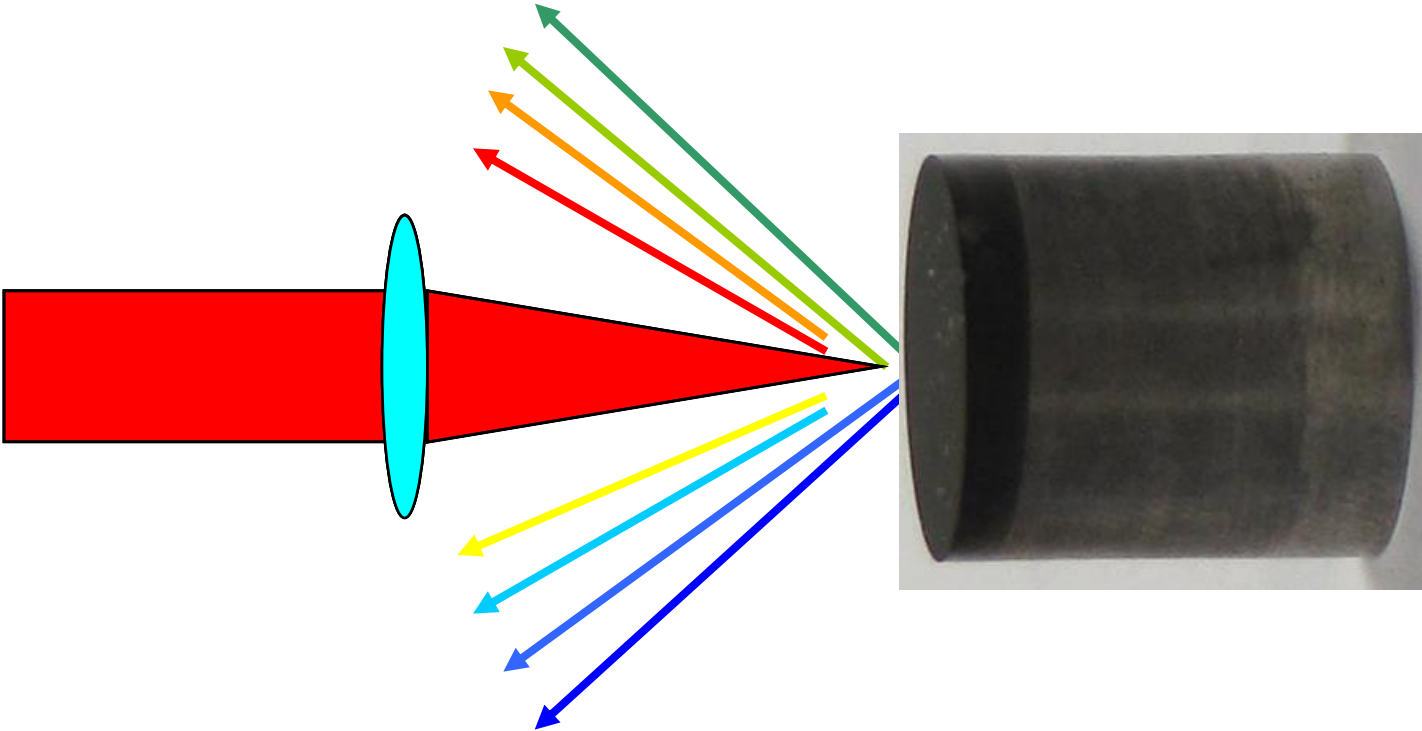
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1 September 2010

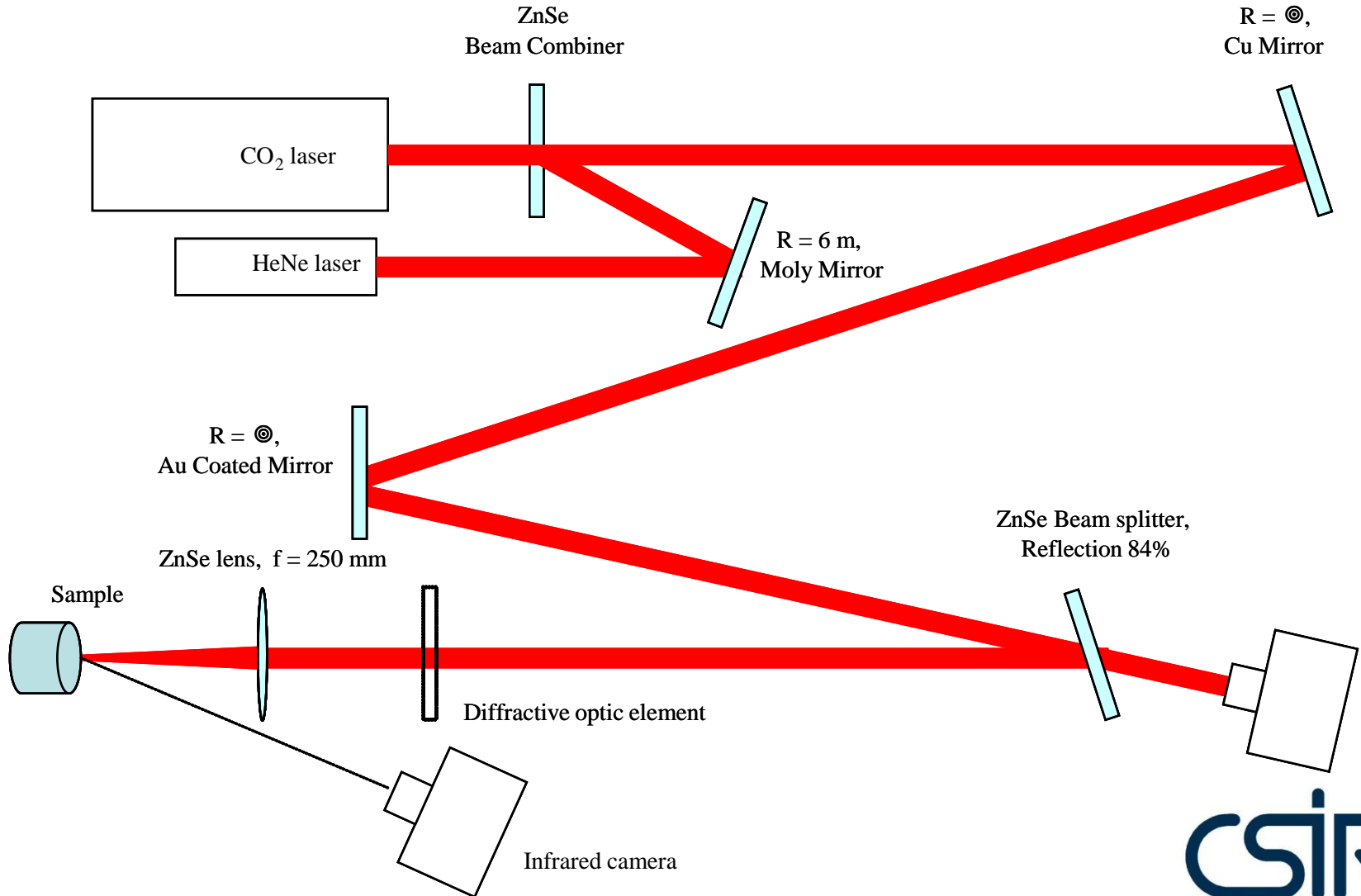
# It is acknowledged that temperature induces damage in the diamond bits due to friction during the drilling process



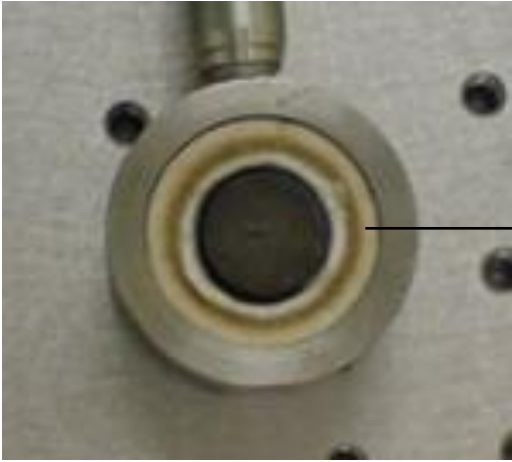
# We can raise the temperature of the diamond sample by laser heating it



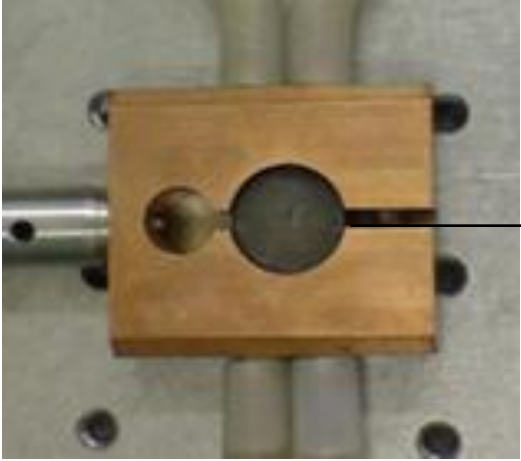
# Laser heating of diamond by optical absorption



# We can engineer two boundary conditions in our experiment

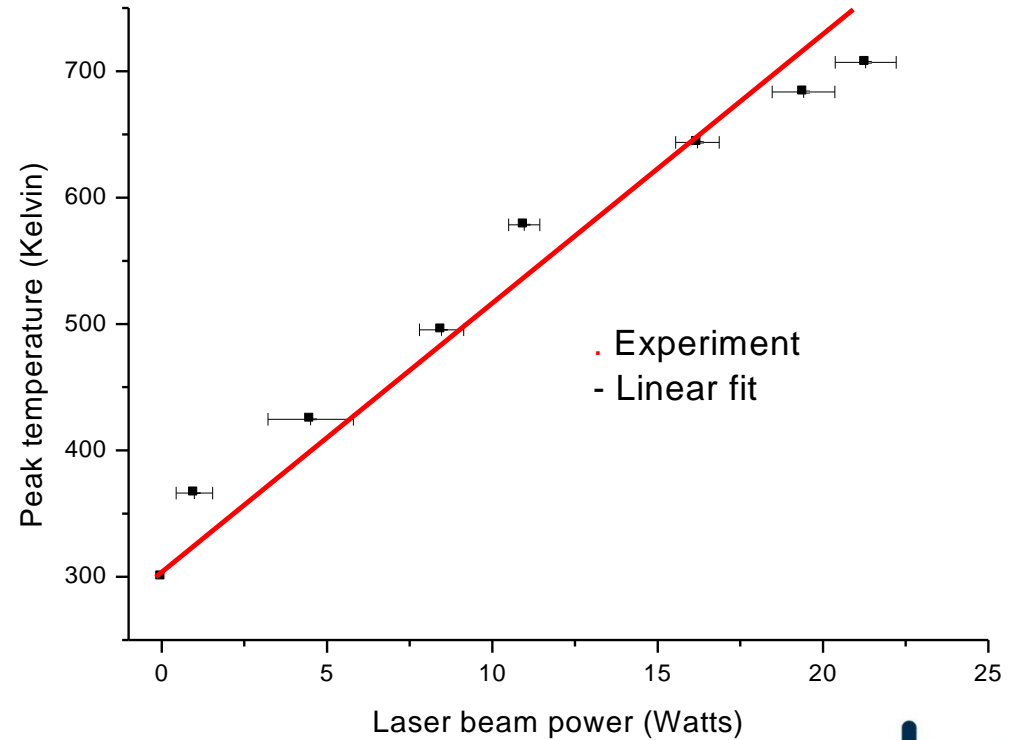


Insulator



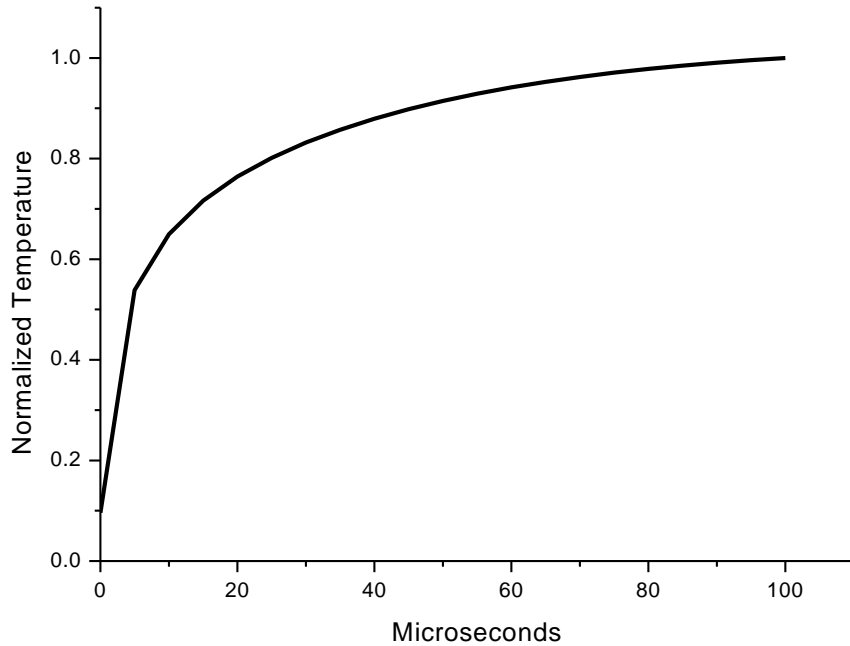
Water-cooled

In insulator case, we expect the peak temperature on the sample to increase as the laser power increases

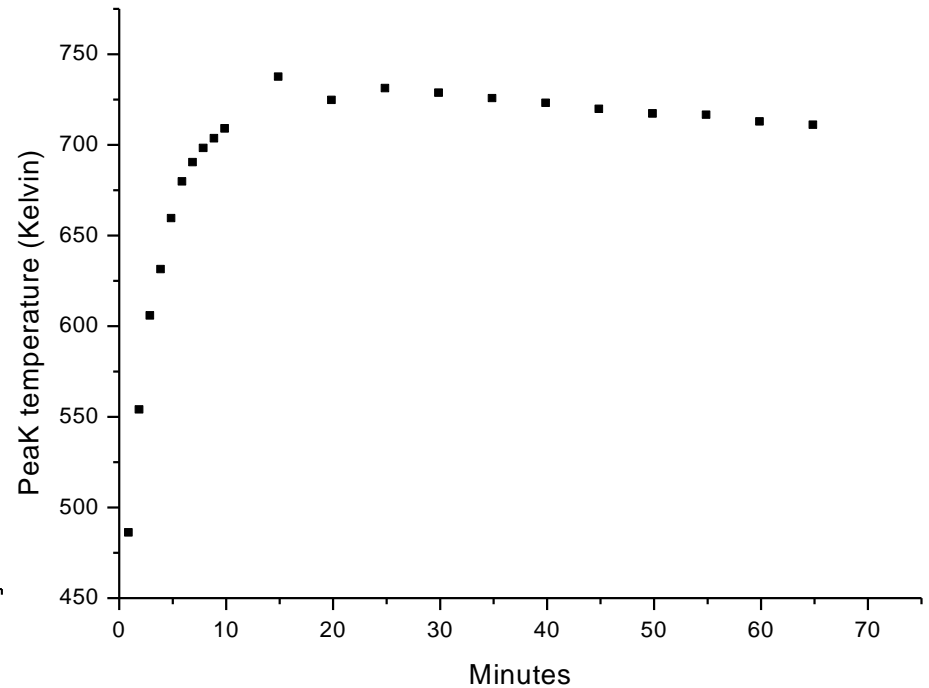


# We expect a rapid rise in temperature until steady state

## Model prediction

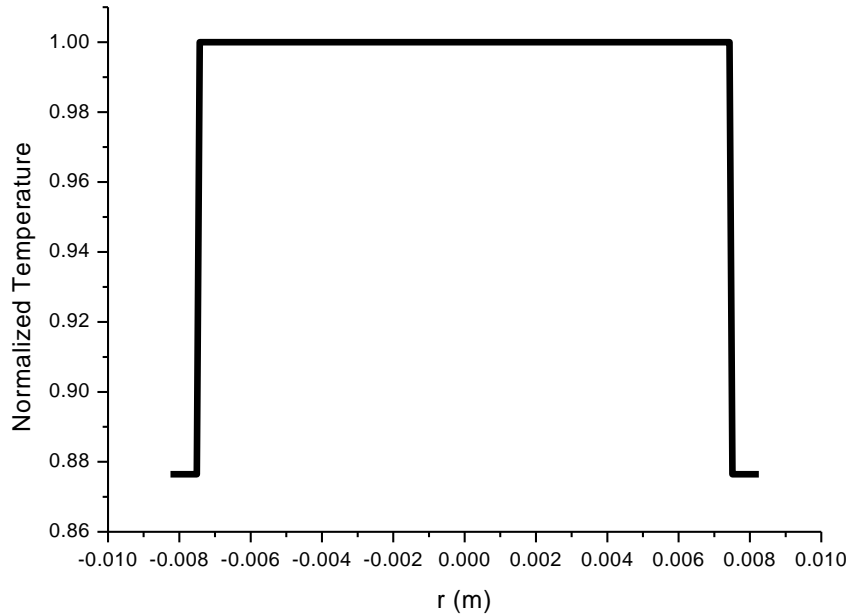


## Experimental data

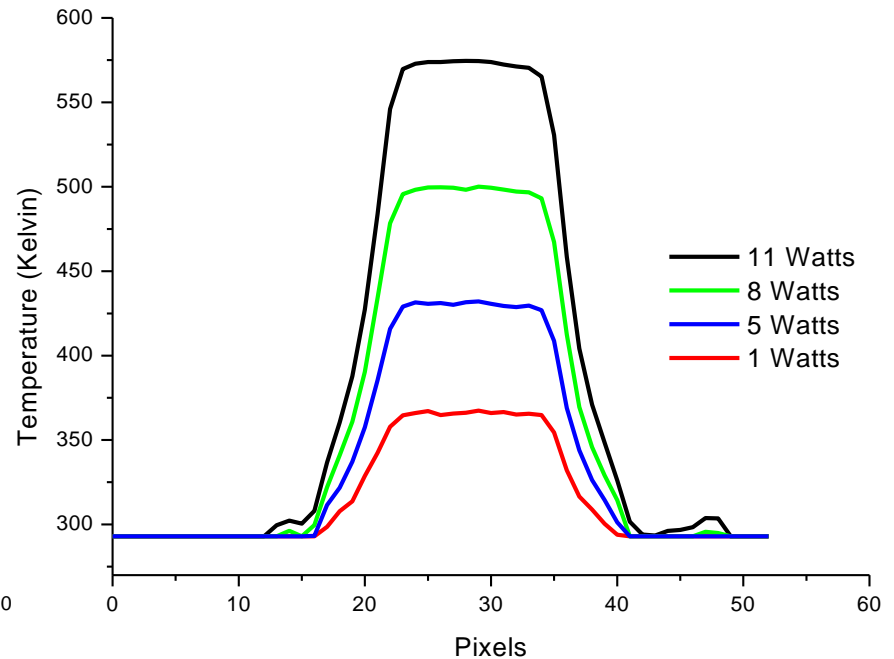


# At steady state we predict a uniform temperature profile across the sample

## Model prediction

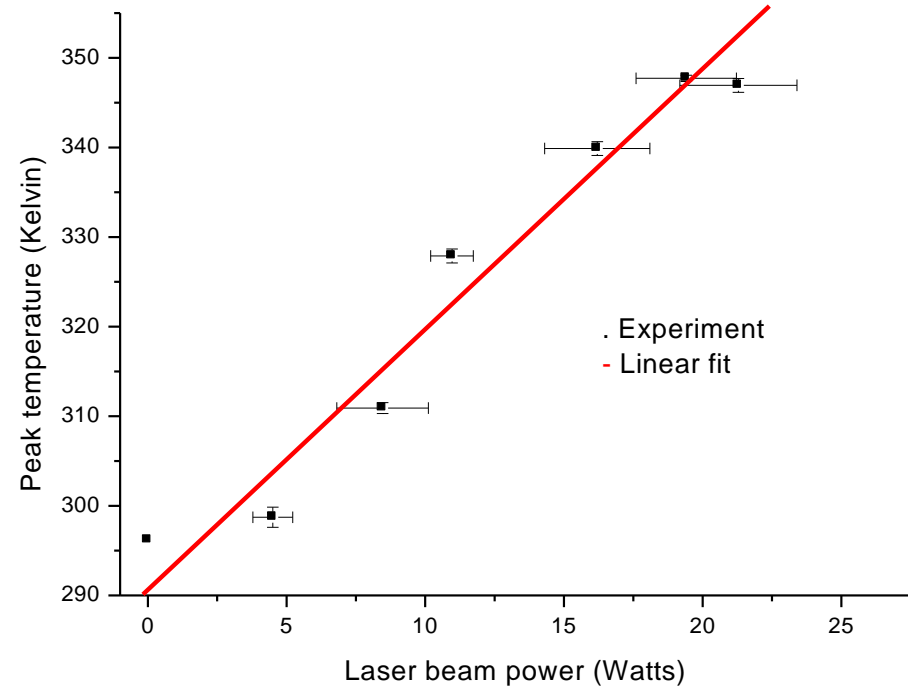
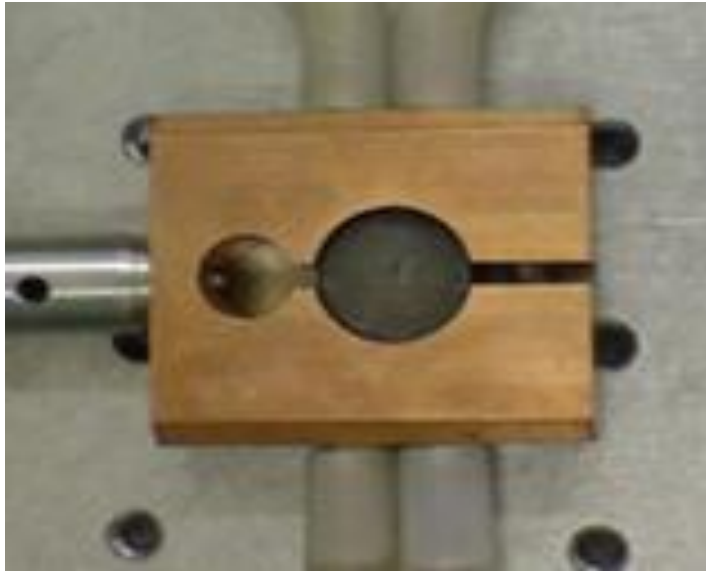


## Experimental data



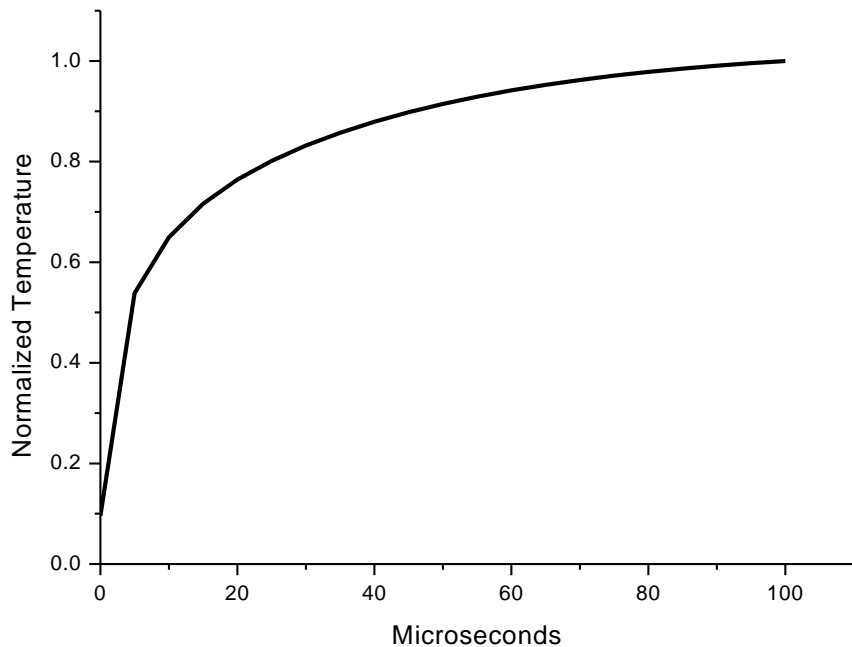


# In water-cooled case, we expect the temperature on the sample to increase as the laser power increases

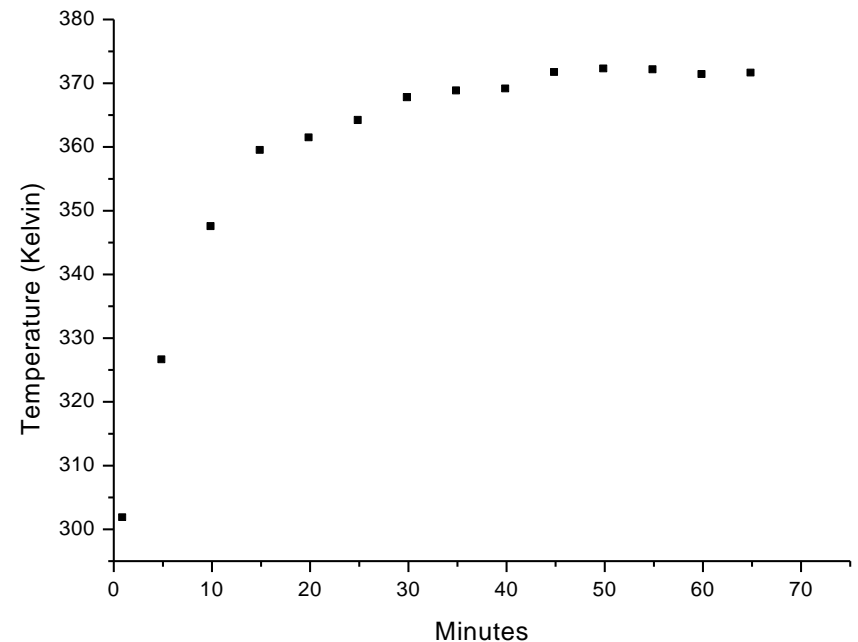


# We expect a rapid rise in temperature until steady state

## Model prediction

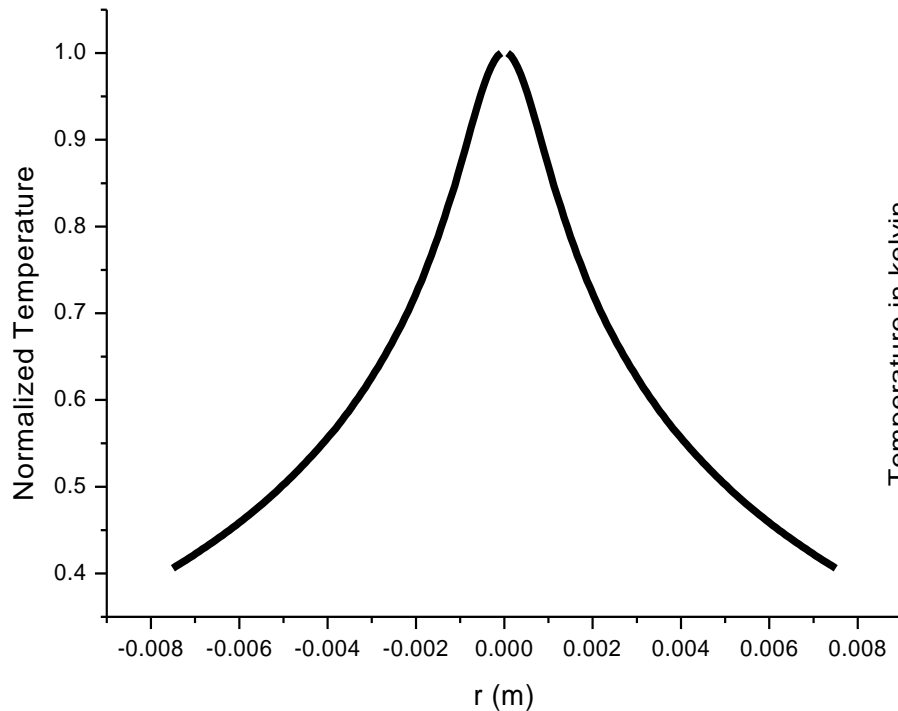


## Experimental data

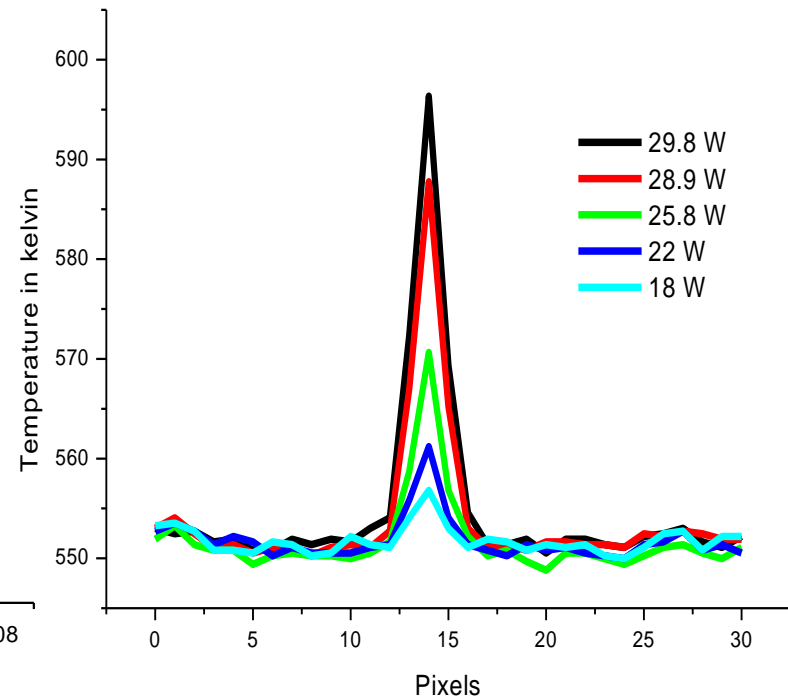


# At steady state we predict a gradient temperature profile across the sample

## Model prediction



## Experimental data



# Summary



# Conclude remarks



**Thank You**