The Wild World of Large Laborious Posters
Create effective posters by thinking like a designer
Why Does Design Matter?

Design is not about decoration; It’s about effectively communicating.

Good design allows you to easily and effectively communicate your ideas visually.
You Are Already A Designer

Every time you use visuals to communicate you are designing.

A few simple choices can make your designs effective.
It’s Not Complicated

Your design can only be as good as the content you start with.

Your poster is a tool that helps you attract an audience and give a dynamic presentation.
The first step in the design process is to answer the question:

What am I trying to communicate?”
Figure out “How do I communicate that?”

Decide what charts, graphs, and images communicate your core message.
Create a hierarchy of information.

The most important information should attract the eye. If you try to make everything equally important the viewer will get overwhelmed and can easily become disinterested.
Start Designing!

Start with a quick sketch that reflects the hierarchy you want to achieve. Follow a few guidelines and you will have an attractive and professional poster.
C.R.A.P
Contrast
Repetition
Alignment
Proximity
Contrast makes objects distinguishable from each other.

Use contrast to draw attention to dominant elements. Every good design has a strong focal point.
Reuse the same elements: colors, fonts, type sizes.

This will give your poster cohesiveness and make your information look organized and well thought out.
Weak Repetition

TITLE ONE
Subtitle Subtitle Subtitle
Information Information Information
Information Information Information
Information Information Information

TITLE TWO
Subtitle Subtitle Subtitle Subtitle
Information Information Information
Information Information Information
Information Information Information

Strong Repetition

TITLE ONE
Subtitle Subtitle Subtitle
Information Information Information
Information Information Information
Information Information Information

TITLE TWO
Subtitle Subtitle Subtitle Subtitle
Information Information Information
Information Information Information
Information Information Information
We use alignment to make sure nothing in your design looks like it was placed there randomly.

Try to align every element to another element. Visualize a grid that everything aligns to.
Weak Alignment

Dilatometry measures the changes in length of a material as a function of different external parameters, such as temperature (thermal dilatation), magnetic field (magnetostriction), or pressure (compressibility). Dilatometry is a thermodynamic quantity sensitive to first or second order phase transitions.

- First-order phase transitions: Clausius-Clapeyron equation
  \[
  \frac{dT}{dp_c} = V_m \frac{\Delta V}{\Delta S} = V_m \frac{\Delta L}{\Delta S}
  \]

- Second-order phase transitions: Ehrenfest relations
  \[
  \frac{dT}{dp_c} = V_m T \left( \frac{\Delta \alpha_c}{\Delta C_p} \right)
  \]

Strong Alignment

Dilatometry measures the changes in length of a material as a function of different external parameters, such as temperature (thermal dilatation), magnetic field (magnetostriction), or pressure (compressibility). Dilatometry is a thermodynamic quantity sensitive to first or second order phase transitions.

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  \]

Quantum oscillation detection using capacitance dilatometry on Y_{111}B,C (Ref 1)
Proximity is all about moving objects closer or farther.

Related items should be visually grouped together.
Weak Proximity

**TITLE ONE**
Subtitle Subtitle Subtitle
Information Information Information Information Information

**TITLE TWO**
Subtitle Subtitle Subtitle

Strong Proximity

**TITLE ONE**
Subtitle Subtitle Subtitle
Information Information Information Information Information

**TITLE TWO**
Subtitle Subtitle Subtitle
Design Tips

Set your file up correctly.

The printer can print up to 43 inches wide. Try to keep the height to 43 inches or smaller. If you want your poster to be cut down to exact dimensions add a border for the print shop to cut along.
Design Tips

Pay attention to the length of your lines of text.

The optimal length for lines of text is 50-75 characters. If the length is too long, the reader’s eyes will have trouble focusing.
Embrace empty space.

Empty space is important because it gives organization and separation to the elements of your design. It also keeps the viewers eye from getting overwhelmed.
Design Tips

Beware of gradients and drop shadows.

Use gradients sparingly and carefully. They can easily make your poster look dated and the text hard to read.
Design Tips

Choose colors wisely.

Colors can be eye-catching and appealing. Watch out for pastels and neon colors because they can easily look unprofessional.
Design Tips

Fonts can make or break you.
Choosing the right font can be a daunting task. Try to limit your poster to 2 fonts. Stay away from fun or funky fonts.
APPROVED FONTS

Sans-Serif
Helvetcia
Open Sans
Calibri
Century Gothic
Franklin Gothic
Gill Sans
Tahoma

Serif
Century
Georgia
Baskerville
Hoefler Text
Times New Roman
Garamond
Design Tips

Use High Resolution Images.

Many images that you pull from the internet will not print well. Try to only use images and figures that are at least 4 x 4 inches and 300 DPI.
Design Tips

Use the correct logos.

A variety of logos with different background colors are available for you on the public drive:

Z:\Public\Logos
High pressure and high magnetic field dilatometry

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Introduction
Dilatometry measures the changes in length of a material as a function of different external parameters, such as temperature (thermal dilatation), magnetic field (magnetization), or pressure (compressibility). Dilatometry is a thermodynamic quantity sensitive to first or second order phase transitions.

- First-order phase transitions: Clausius-Clapeyron equation
  \[ \frac{dP}{dT} = \frac{\Delta S}{\Delta V} \]
- Second-order phase transitions: Eshelby relations

Dilatometry measurements at the National High Magnetic Field Laboratory

Capacitance
- Sample attached to movable capacitance plate
- Variation of capacitance with sample expansion
- Resolution: 0.1 A at low T
- Sensitive to field

Piezo Cantilever
- Atomic force microscope tip on sample
- Resistance change in piezoelement with sample expansion
- Resolution: 0.1 A at low T
- Sensitive to field

Fiber Bragg Grating
- Periodic n-index modulation, refracts one Bragg wavelength \( \lambda_b \)
- Shift in \( \lambda_b \) with strain \( \Delta \)
- Sample expansion along fiber
- Resolution: \( \Delta \lambda_b \approx 0.1 \mu m \)
- Can be coupled to and used into pressure cells!

Principle of FBG measurement

- Ultraviolet laser centered around 1550nm
- Circulator: separates incoming and going beams
- \( \lambda_b \) refracted from FBG spread by spectrometer
- Detected by 92KHz/μV/s linear array camera (Goodrich). Resolution: 0.067nm/pixel
- Gaussian fit of \( \lambda_b \) for sub-pixel resolution
- Differential measurement with 2° empty FBG

Piston cylinder cells
- May be piston cylinder cell
- Developed at the NHMFL
- P: 2 GPa
- Sample space: Ø1.5mmx2mm
- Can rotate
- Allows use in confined space of a dilution refrigerator and magnet bore
- Body of the cell: MP35+N
- Piston: non magnetic W-C
- Ruby fluorescence line: measure P

Preliminary results

Pressure measurement with a FBG

- Theoretical behaviour of FBG with various strains (5)
  \[ \Delta \lambda_b = \frac{1}{2} (P \cdot \nu + \Delta T \cdot 2) \]
  \( \nu \): Poisson’s ratio, \( \approx 0.20 \)
  \( P \): components of strain-optic tensor
  \( \Delta T \): thermal expansion coefficient

- For 25MPa: \( \Delta \lambda_b \approx 1.4 \mu m \) (1.5p to 1.9p)
- For 15MPa: \( \Delta \lambda_b \approx 0.8 \mu m \) (1.5p to 1.9p)
- For 67MPa: \( \Delta \lambda_b \approx 0.8 \mu m \) (1.5p to 1.9p)

- Reasonable agreement, sensitive to \( \nu \)

References

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- “We acknowledge J. Xue for the NdFeB samples.
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High Pressure & High Magnetic Field Dilatometry


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Introduction

Dilatometry measures the changes in length of a material as a function of different external parameters, such as temperature (thermal dilatation), magnetic field (magnetostriiction), or pressure (compressibility). Dilatometry is a thermodynamic quantity sensitive to first or second order phase transitions.

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\[ \frac{dT}{dP} = \frac{\Delta V}{\Delta S} \]

- Second-order phase transitions: Ehrenfest relations

\[ \frac{d\alpha}{dT} = \frac{\Delta x}{\Delta T} \]

With: \( \alpha = \frac{1}{L} \frac{dL}{dP} \)

Thermal expansion: \( \beta \) = \( \alpha \frac{V}{V_0} \) x 100

Magnetostriiction: \( \lambda = A \Delta H \)

Compressibility: \( \kappa = \alpha \frac{V}{V_0} \) x 100

Capacitance

Sample attached to movable capacitance plate
Variation of capacitance \( \Rightarrow \) sample expansion
Resolution: 0.1A at low T
Sensitive to field

Piezo Cantilever

Atomic force microscope tip on sample
Resistance change in piezo element
\( \Rightarrow \) sample expansion
Resolution: 0.1A at low T

Fiber Bragg Grating

Periodic n-index modulation
Refractions Bragg wavelength \( \lambda_b \)
Shift in \( \lambda_b \) \( \Rightarrow \) strain
Resolution: \( \Delta \lambda_b \)

Can be coupled to and used into pressure cells!

Principle of FBG measurement

“Mini-me” Piston Cylinder Cells

UV laser centered around 1550nm
Circulator separates incoming and output beams
\( \lambda_b \) reflected from FBG span by spectrometer
(Acton SP3500, 1500mm, 600g/mm)

Detected by 920H: InGaAs linear array camera
(Goodrich): Resolution: 0.005nm/pixel

Gaussian fit of \( \lambda_b \) for sub-pixel resolution
Differential measurement with 2nd empty FBG

Pressure measurement with a FBG

Theoretical behaviour of FBG with various strains (5):

\[ \frac{\Delta \lambda_b}{\lambda_b} = \left( \frac{\alpha - \beta + \alpha_{	ext{opt}}}{\lambda_b} \right) \Delta T \]

\( \alpha_{	ext{opt}} \): Poisson’s ratio, \( \alpha \): thermal expansion coefficient

For 28MPa: \( \Delta \lambda_b \sim 1.4\text{ppm} \)
For 52MPa: \( \Delta \lambda_b \sim 2.8\text{ppm} \)
For 87MPa: \( \Delta \lambda_b \sim 3.5\text{ppm} \)

Room T measurement of empty FBG

Response in a High Pressure Interferometer cell

Pressure medium: \( \text{H}_2 \)

References


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THANK YOU

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