How to make a poster

...also how you shouldn't, why you should care, and how they matter

SUMR Meeting 7: Making a maths poster

Wednesday 28th August, 3pm

WARWICK
THE UNIVERSITY OF WARWICK

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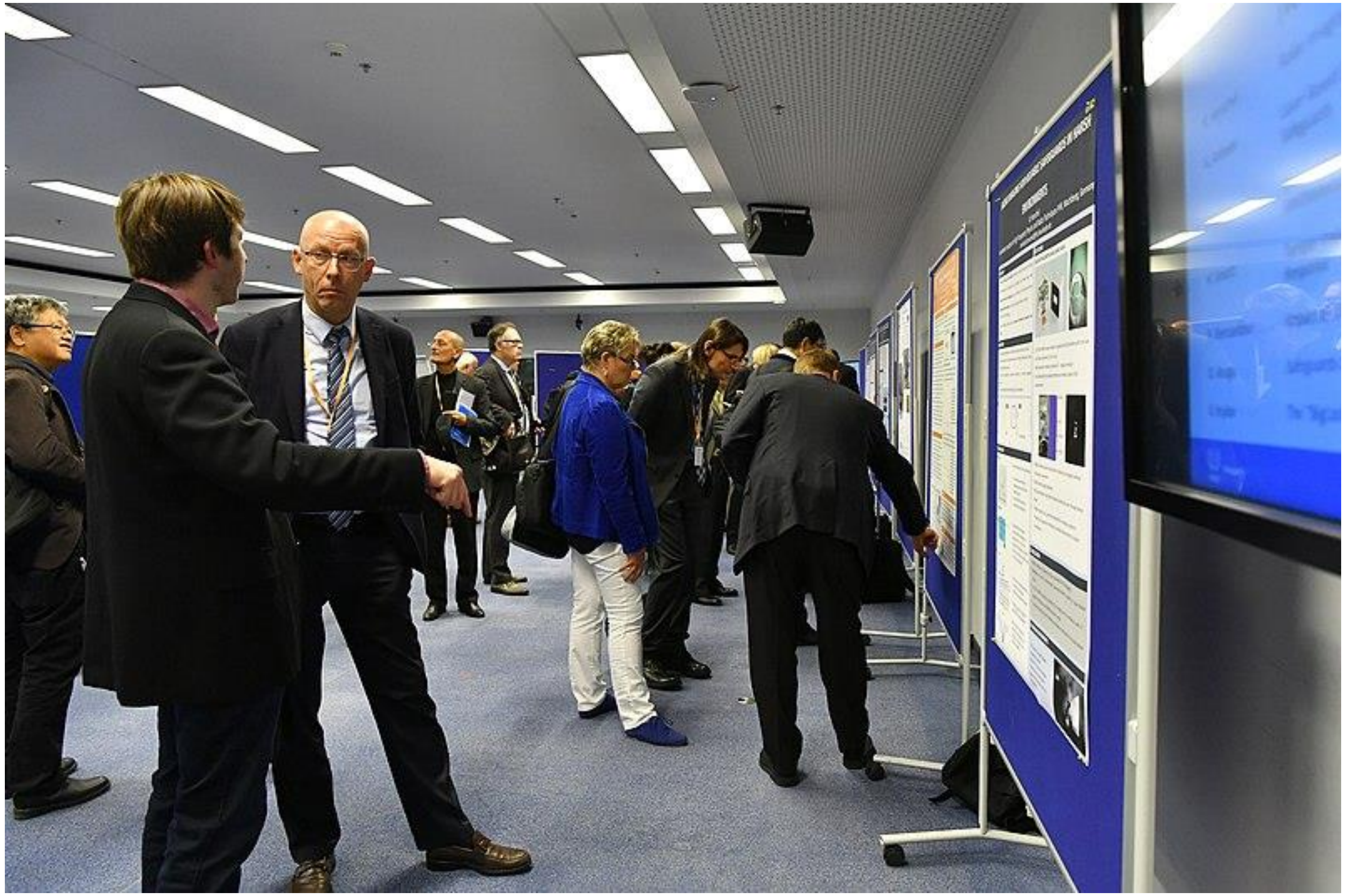
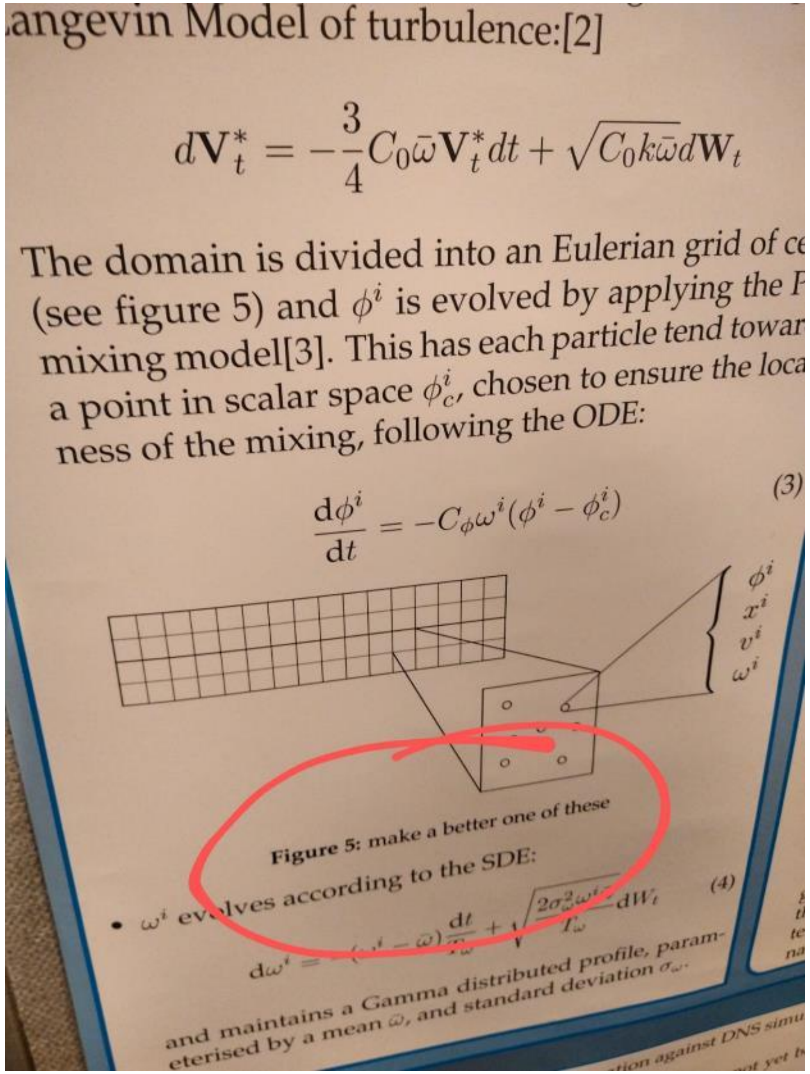
What are posters?



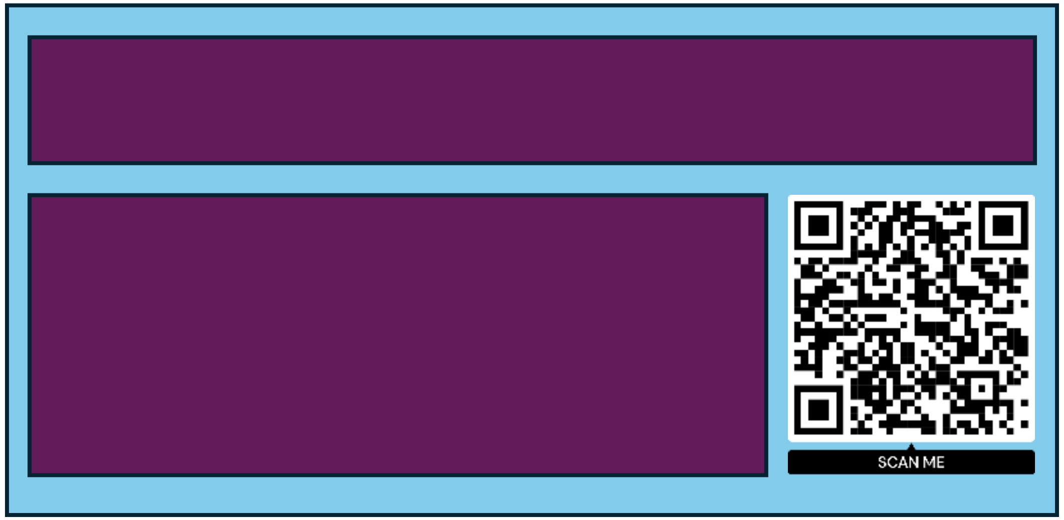
- Posters are usually presented in one of two ways:
  - In a huge poster session (pictured)
  - As part of a ‘flashtalks’ event (rarer, but common for early-career stuff in some fields)
- Physically, usually A0/A1 (big!)

Take-home messages



- **Posters are important** – they’re not just a “I didn’t get a talk, so I’ll just make a poster” cop-out
- **Posters need to be good** – unlike in a talk, people have no politeness incentive to stick around
- **Posters need to stand out** – there’s usually lots of them, all next to each other
- **Posters need to serve a dual purpose** – they’re a presentation aid, like slides, for when you’re there, but they need to make sense on their own

Purposes of a poster



The "paper advert"

- Catchy – should stand out
- Centred around the key finding
- Light on detail
- Make it easy to get to the paper – a reference won't be enough

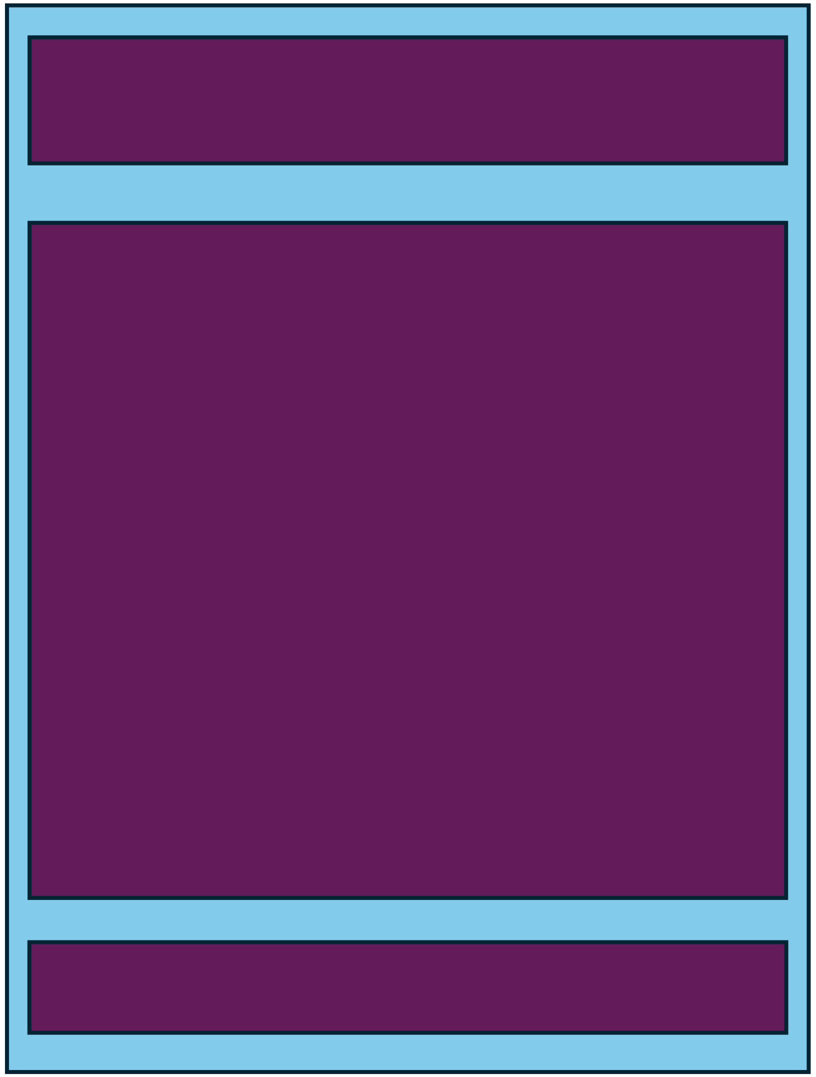
The "project summary"

- Gives detail to a level short of a paper, but more in-depth than a talk
- Walks through the key points so somebody can understand what you've done
- Can be dense – often best avoided

The "talk guide"

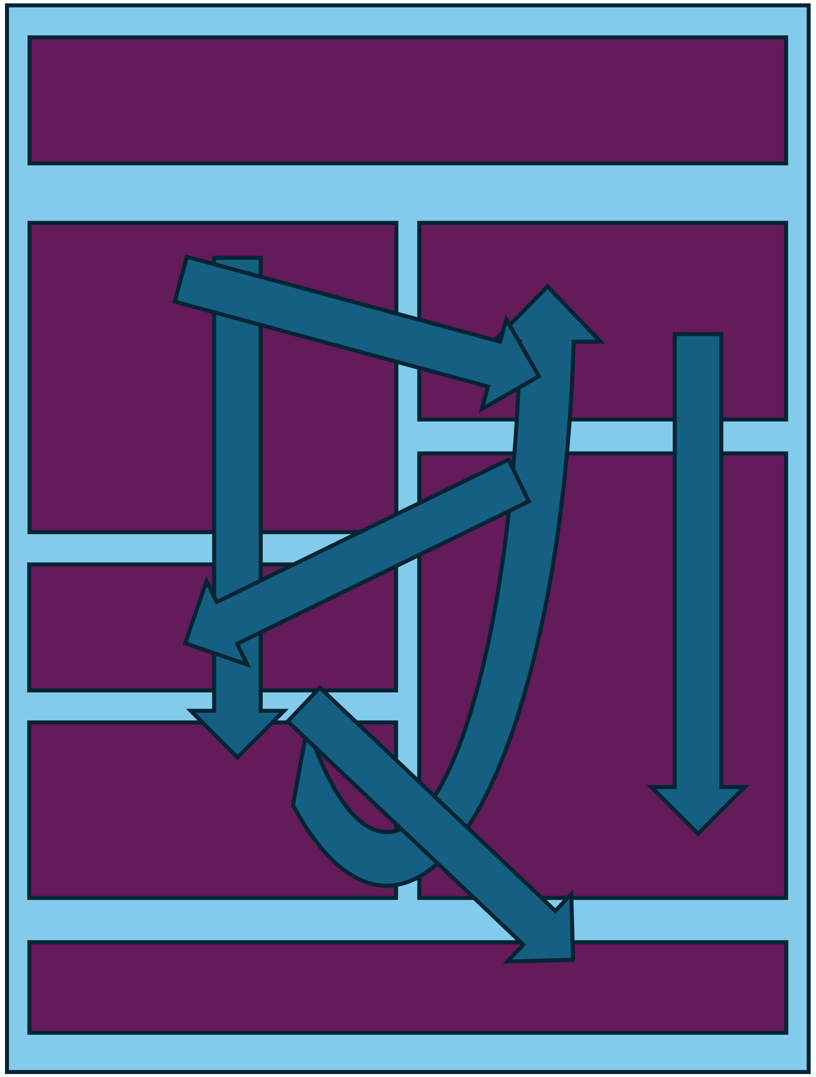
- Gives graphical pointers and equations that let you explain your work
- You *need* to be present the whole time or it'll make no sense

Structuring a poster



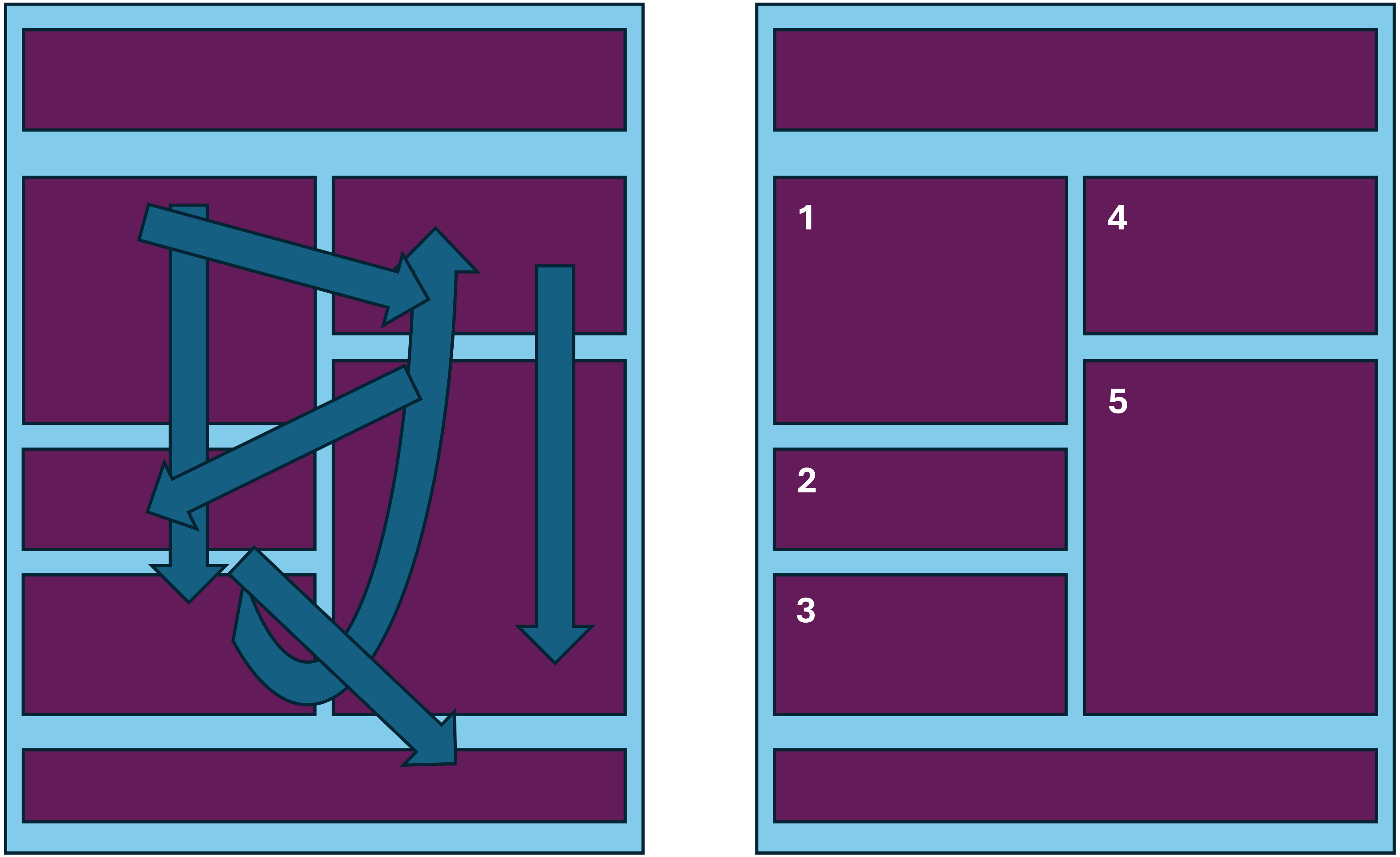
- Hard to read
- Remember that this is *not* a paper and needs to be spotted from across a room
- Pictures are important! Include graphs, but remember that axis labels and numbers need to be bigger

Structuring a poster

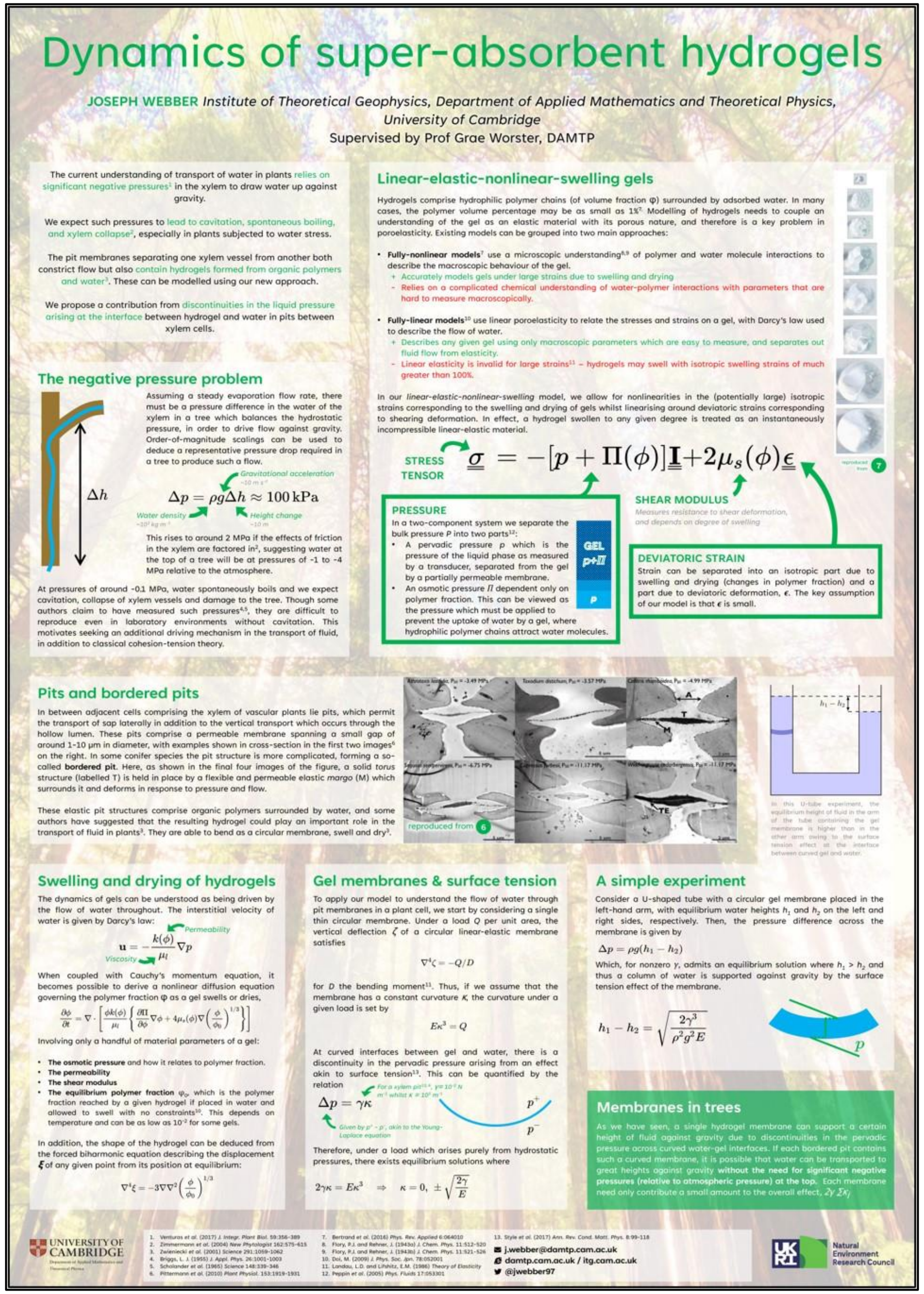


- If someone *is* interested, it needs to be easy to follow
- Can’t tell a story if there’s no clear order to it

Structuring a poster



- Text is too small
- No clear story
- Contrast is low between elements
- Too much content
- Generic, vague, title
- Text style is too much like prose from a paper



- Clear colour, eye-catching image background
- Pictures used to illustrate points
- Judicious use of equations
- Summary points on top left-hand corner
- List of further information references

Practicalities

- **Format:** paper size (and orientation) usually specified by organisers. If not, think about whether landscape or portrait suits your subject better.

- **Visibility:** as a rule of thumb, the title and key subject matter should be readable from 3m away. <u>Everything</u> should be visible from 1.5m away.

  - Remember that, statistically speaking, you'll have better eyesight than the average attendee. If in doubt, make things bigger.

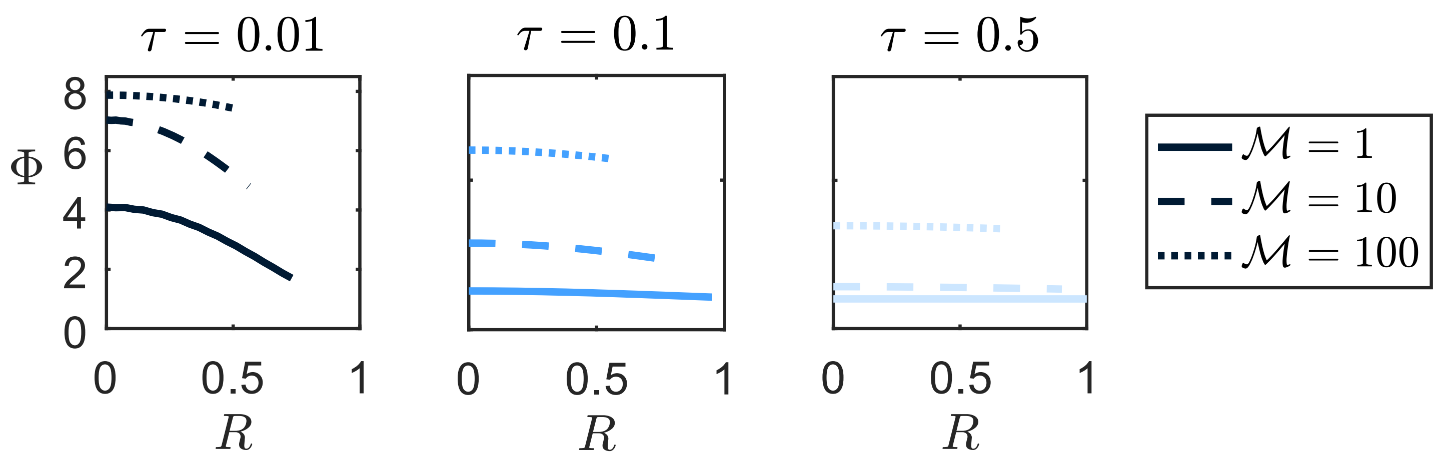
  - Sources of unnecessary clutter include gridlines/too many axis ticks on figures, complicated shadings, irrelevant labels, etc. Be ruthless.

Formatting tips

- **Font sizes:** always bigger than you think it should be (24pt is often too small for body text)
- **Font families:** unless you have a really good reason otherwise, body text should be sans serif (though just because a font is sans serif doesn't mean it's a good choice)
- Titles need to be huge – 120-150pt. Make sure they're a dark(ish) colour.
- A note – this will all look silly on screen, and as it begins to come out of the printer. You'll panic and think you've overdone it.

Formatting tips

- **Figures:** make sure labels are “too big” – you need to exaggerate…



- Don’t just lift figures you’ve made for papers – they need to be designed **for** the poster:
  - No extraneous labels
  - No patterns/grids
  - Minimal axis ticks, thick lines and clear legend

Formatting tips

- **Equations** – people have some *strong* opinions on this:

...In general, reducing M and increasing P leads to a faster deswelling as the shear resistance is decreased and the pressure driving flows is increased. Thus, as t~P/M, we can see in figure X that...

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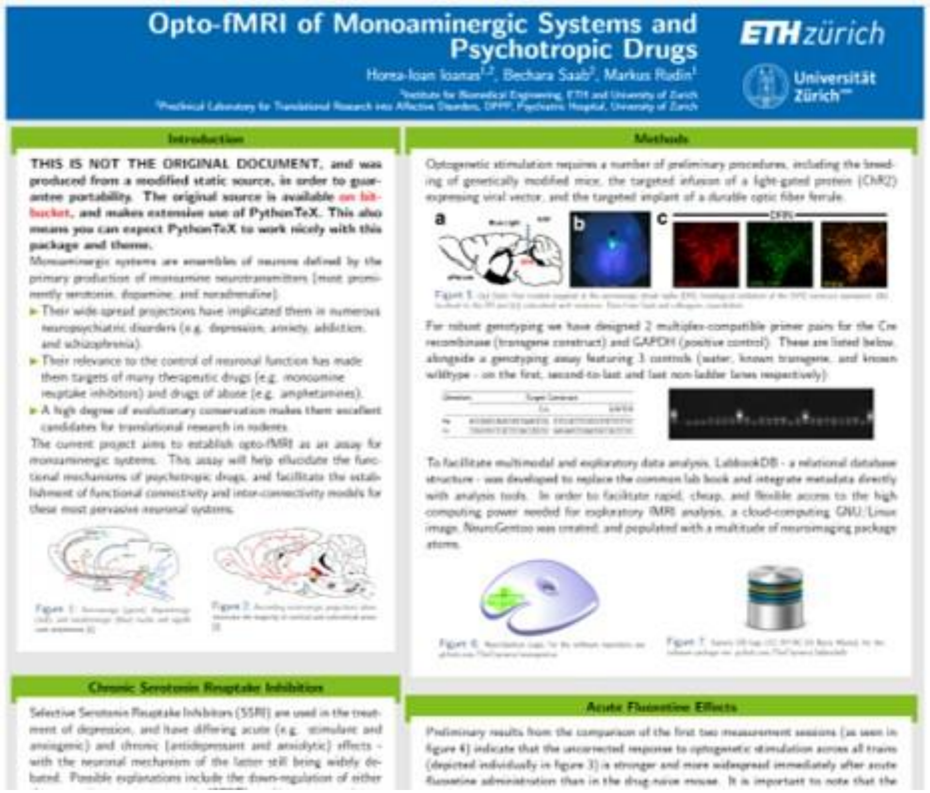
viereck.ch/latex-to-svg

Formatting tips

- **Thoughts on LaTeX** There are lots of `beamer`-based approaches to making posters, which *can* produce some good-looking results



deselaers/latex-beamerposter on GitHub

<u>Short summary: don't bother</u>

Formatting tips

My go-to tools for putting together a poster

- You know how to use it already
- Fine degree of control over formatting/layout
- Native vector support
- Shape Format > Size > expand arrow and use the Size+Position pane
- Easy export to PDF at high resolution
- Design > Slide Size > Custom Slide Size… to set A0/A1 etc.

colorcet.com
Gives colour maps and palettes that are “perceptually uniform” and also has options that suit various types of colour blindness. Easy to include in basically any software tool you’re using.

viereck.ch/latex-to-svg
The best free online one of these (I usually use my own version on Windows).

warwick.ac.uk/about/brand
Get hold of university logos and read the guidelines for their use. Gives specific colours and resources in a number of formats.

Stokes drift through corals

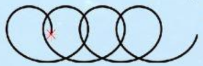
JOSEPH WEBBER Trinity College, University of Cambridge

Project supervised by Prof Herbert Huppert FRS at the Institute of Theoretical Geophysics, Department of Applied Mathematics and Theoretical Physics. Funding from the Heilbronn Fund at Trinity College.

Stokes drift

- Waves in the ocean result in a drift effect of water under the surface, in a phenomenon known as *Stokes drift*, named after Sir George Gabriel Stokes FRS (1819-1903, pictured).

If we follow the path of an individual 'parcel' of water below the surface undergoing wave motion, we find that it spirals along, drifting with the direction of the wave propagation. In the adjacent diagram, a fluid parcel starts at the position of the red asterisk, and travels with the wave to the right.



- The drift is an entirely horizontal effect, and is well-documented, in, for example, Stokes[1] (1848) and Phillips[2] (1977). In a shallow sea, of depth *1*m, and with waves travelling at ~*1.5*ms^{-1}, with ω=2s^{-1}, a typical velocity is ~*0.05*ms^{-1}.

Applications

Koehl *et al.*[3] and other papers emphasise the importance of flow of water through coral reefs to bring nutrients and oxygen to inhabitants – understanding the flow profile is vital for understanding these ecosystems. We plan to compare these results with those of fieldwork.

Explanation

- We describe the fluid flow in two distinct regimes – the porous layer, dominated by viscous effects and described by Darcy's Law, and the upper layer, which is essentially inviscid.
- Matching the layers at their interface, we derive the wavenumber k as a function of frequency ω, which is a complex number – the waves have both an oscillatory part and a decaying effect due to damping.

Frequency of waves | Viscosity of water | Depth of upper layer

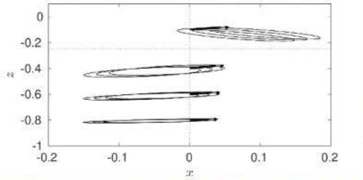
$$\kappa\omega \tanh k\,(D-d) - i\nu \tanh\left[\operatorname{arctanh}\left(\frac{\omega^2}{gk}\right) - kd\right] = 0$$

Permeability of porous layer | Depth of porous layer | Gravity | **Wavenumber**

- The vertical drift can be understood by considering a small particle undergoing wave motion. The particle moves **forwards and down**, followed by **backwards**, and then **back up again**. But as the magnitude of vertical velocity reduces with distance due to damping, there is net motion perpendicular to the wave propagation.

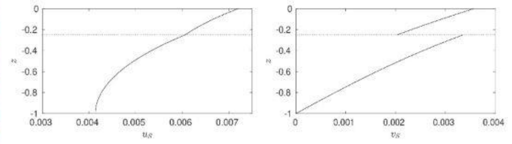
Effect of a porous layer

- Placing a porous layer, like a coral reef, below the wave surface, as shown in the diagram below, damps the waves and means that the amplitude decreases as horizontal distance increases in the direction of wave propagation, denoted *x*.
- As the horizontal drift speed is dependent on the amplitude of the waves, the horizontal drift speed reduces with distance in the direction of wave propagation.
- **Most notably, a vertical drift effect is introduced as a result of the damping.**
- This small drift effect can be seen by tracing out particle paths – in the below case, *D=1*, *d=0.25*.

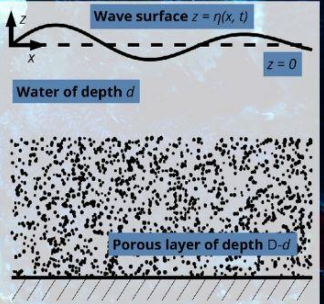


Velocity profiles

Fluid is naturally seen to drift faster in the upper layer, where there is no viscous resistance to its motion. The velocity profiles reduce to those for no reef in the limits as the reef becomes more porous, or thinner.



Stokes drift velocities in the horizontal (left) **and vertical** (right) **directions at** *x = 0.00* **when** *D = 1.00, d = 0.25* **and waves have a frequency** ω=2



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(1) **Stokes, G.G.** 1847 On the theory of oscillatory waves. *Trans. Camb. Philos. Soc.* **8**, 441-455
(2) **Phillips, O.M.** 1977 *The Dynamics of the Upper Ocean*. Cambridge University Press
(3) **Koehl, M.A.R., Powell, T.M. & Dobbins, E.L.** 1997 Effects of algal turf on mass transport and flow microhabitat of ascidians in a coral reef lagoon. *Proc. 8th Int. Coral Reef Symp.* **2**, 1087-1092

based on **Webber, J.J. & Huppert, H.E.** Stokes drift through corals (submitted to Journal of Fluid Mechanics)

Putting this into practice

Things to consider

- Order of content – how do you make this clear?
- Placement and number of figures
- How to catch peoples' eyes
- What are the 3-5 key points you want people to take away?
- How can you tell a story both with and without involved mathematics?

- **Sketch out a plan of what a poster summarising your summer research might look like**
- Don't need the actual content, but layout/figures/take-home messages/title should all be there
- What poster pitfalls do you think your project might be especially prone to?