

# Getting most out of conferences

Dr Öznur Apsimon





# 2014

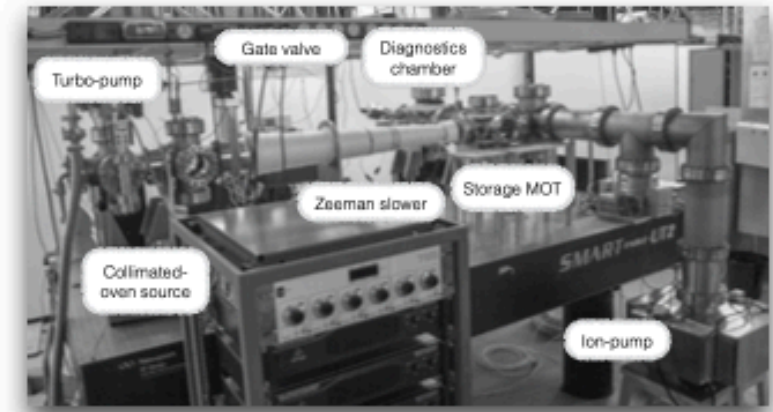
## AN ULTRA-COLD ELECTRON FACILITY IN MANCHESTER

International Particle Accelerators Conference  
15-20 June 2014, Dresden, Germany

R. Appleby<sup>1,5</sup>, W. Bertache<sup>1,4</sup>, S. Chattopadhyay<sup>1,2,3,5</sup>, M. Harvey<sup>1,4</sup>, Q. Mete<sup>1,5</sup>, A. Murray<sup>1,4</sup>, G. Xia<sup>1,4</sup>

<sup>1</sup>The University of Manchester, <sup>2</sup>The University of Liverpool, <sup>3</sup>The University of Lancaster, <sup>4</sup>The University of Manchester Photon Science Institute, <sup>5</sup>The Cockcroft Institute for Accelerator Science and Technology, <sup>6</sup>The European Organisation for Nuclear Research

**ABSTRACT** An ultra-cold atom based electron source (UCAE) facility has been built in the Photon Science Institute (PSI), University of Manchester. In this paper, the key components and working principles of this source are introduced. Pre-commissioning status of this facility and the preliminary simulations results are presented.



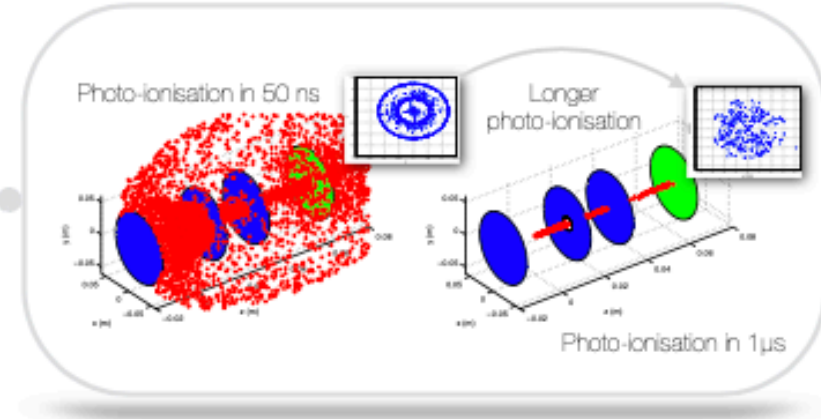
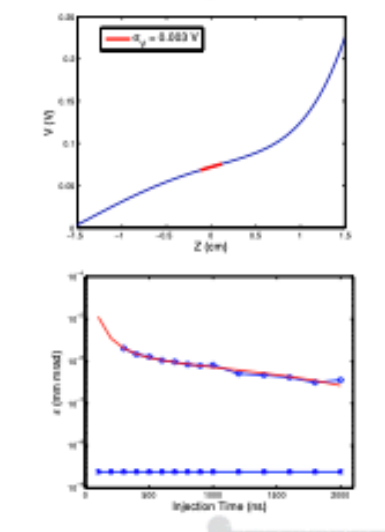
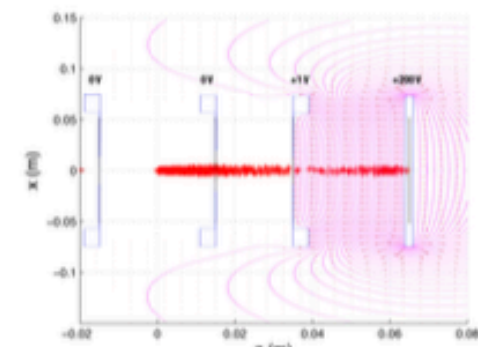
Coat Atom Trap Based Electron Source The University of Manchester

**INTRODUCTION** Manchester's ultra-cold atom trap based electron source setup consists of an atom source, Zeeman slower, magneto-optical trap, storage and diagnostics chambers. An atomic beam is produced using a Rubidium (Rb) oven. The slowing of the atoms is performed through deceleration with a counter propagating laser beam by momentum transfer from the laser field. The fundamental problem of the scheme is Doppler shift of atoms out of resonance with respect to the laser beam. This originates partly from the certain line width of the laser and partly from the initial momentum distribution of the atoms. Doppler shift can be compensated by using a spatially varying magnetic field for shifting resonance atomic transition to match the laser frequency. This is provided by a setup called Zeeman Slower that consists of a solenoid with varying magnetic field. Confinement of the atoms are achieved in a magneto optical trap (MOT). Three pairs of circularly polarised, counter propagating orthogonal laser beams and an inhomogeneous magnetic field provided by anti-Helmholtz coils form the atom trap.

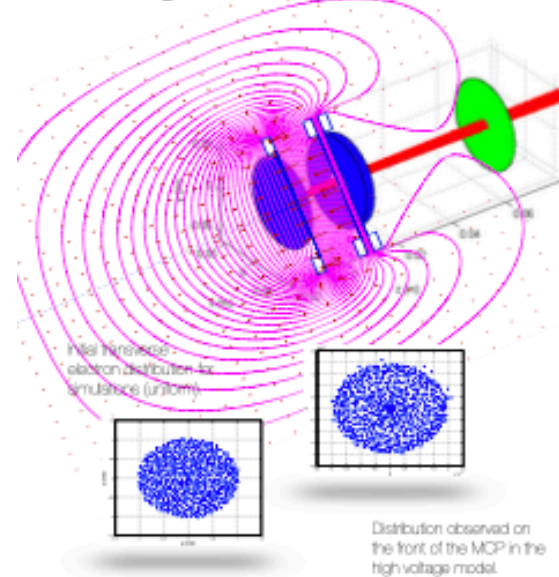


**A new technique, the AC-MOT, was invented in the University of Manchester.** This technique relies on the fast switching (< 20  $\mu$ s) of the magnetic field on the coils and therefore provides a magnetic field free time for production and extraction of the electrons. This is important in order to prevent the electrons gaining transverse momentum due to the magnetic field which will lead to the growth of the beam emittance. An atom cloud can be maintained in the storage MOT and it can be pushed to the experimental chamber by using a laser beam. For the initial commissioning, the experimental chamber contains the electron extraction electrodes and a multi-channel plate (MCP) detector for beam profile measurements.

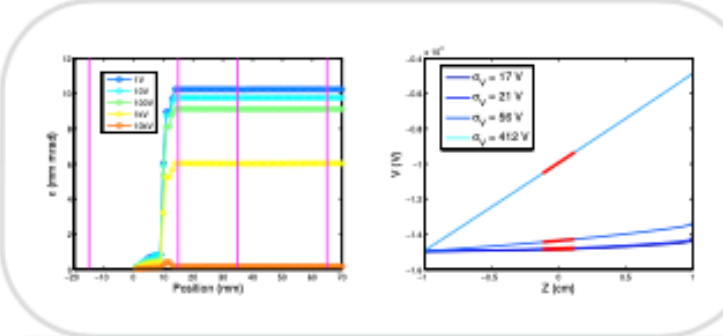
### Penetrating field model



### High voltage model



Ionised electrons will be separated and transferred out of the MOT towards the diagnostic stages or onto an experiment. A set of three electrodes is used to provide the extraction field. Electrodes are made out of fine mesh that is transparent to the laser beams and still provides 99% transmission for the electrons. Bias voltages and the locations of the electrodes can be configured to provide different initial beam characteristics. Beam tracking was performed by using General Particle Tracer code (GPT) [8]. 3D space charge force was taken into account to study the extraction process. The setup can function either in 'penetrating field' or in 'high voltage' mode to provide low energy spread or low emittance, respectively.



### CONCLUSIONS AND OUTLOOK

Pre-commissioning simulation results and operation modes of the cold atom trap based electron source in Manchester were presented in this paper. It has been numerically shown that it is possible to produce and extract electrons with energy spread of 3 meV or emittance of 0.2 mm mrad. Initially, before beam commissioning to improve the beam quality even further. Forthcoming beam commissioning of the facility will initially assess beam profiles and emittance extracted from the system. The ionisation of the MOT with different laser wavelengths will be tested. The voltage difference across the MOT might be compensated by providing a large enough laser bandwidth rather than a monochromatic beam. This would allow creating a beam with low energy spread and low emittance, simultaneously. Within the mid-term plans the facility will be modified for more sophisticated beam manipulation by including an RF acceleration section, focusing elements and a pepper pot emittance measurement station. The screening effect of positive ions in the MOT, present briefly after the ionisation of the electrons, will be numerically studied as it might mitigate a fraction of the space charge induced emittance growth. Momentum directions of the electrons can be initiated by the electric field vector of the laser ionising them. This phenomenon is also under numerical study alongside with the evolution of the different initial spatial distributions such as a hollow beam.

- REFERENCES**
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  - [7] G. Xia et al., arXiv:1404.3809[physics.acc-ph](2014).
  - [8] S.B. van der Geer and M.J. de Loos, <http://www.pulsar.nl/gpt/>.



2015

# LOW ENERGY BEAM TRACKING UNDER SCATTERING FOR A COLD ELECTRON SOURCE IN MANCHESTER

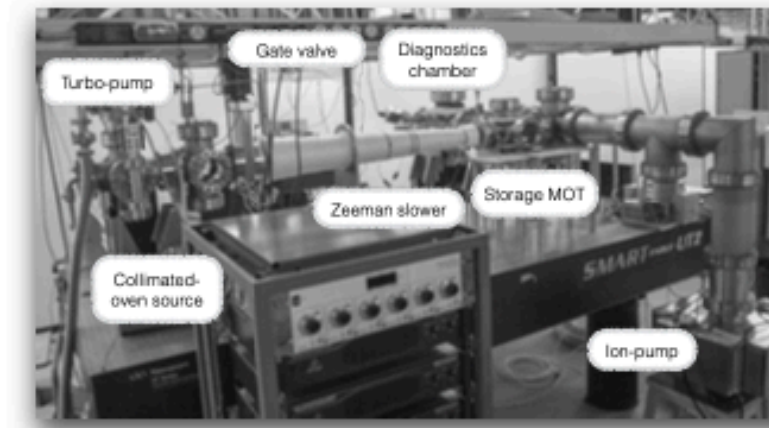
R.B. Appleby<sup>a</sup>, W. Bertsche<sup>b</sup>, M. Harvey<sup>c</sup>, M. Jones, B. Kyle, O. Mete<sup>d</sup>, A. Murray<sup>e</sup>, G. Xia<sup>a</sup>

<sup>a</sup>The University of Manchester and

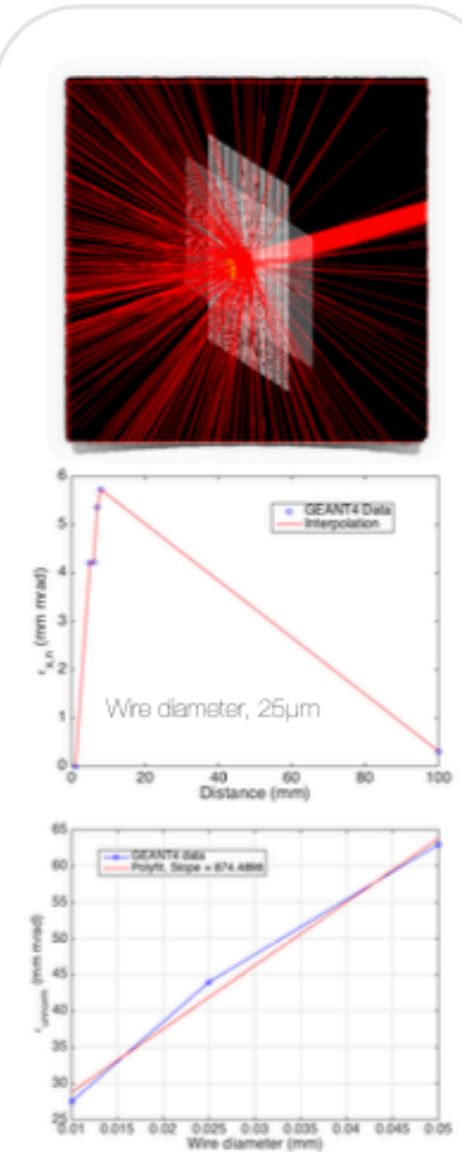
<sup>b</sup>The Cockcroft Institute of Accelerator Science and Technology, <sup>c</sup>European Organisation for Nuclear Research, CERN, <sup>d</sup>Photon Science Institute.

**ABSTRACT** High quality electron beams, with high spatial and temporal resolution, have an important use in electron diffraction experiments to probe and study the constituents of matter. A cold electron source is being developed based on electron ionisation from an atom cloud trapped by using AC magneto-optical methods in the University of Manchester. The technique will produce bunches of electrons well suited for high precision and single shot electron diffraction. In this paper issues of modelling at low energies for this state of art electron source with very low energy spread are presented, with a focus on newly developed tools to model the scattering in the meshes used to support the extraction electric fields. The dependence on emittance growth on mesh wire thickness is studied.

**INTRODUCTION** Electron diffraction experiments are an integral part of many fields of research, including crystallography, spectroscopy and investigations into chemical bonding. As these fields progress, there is an ever-increasing need for electron beams with better spatial and temporal resolution, requiring investigation into novel methods of increasing beam quality. The AC-MOT, currently being developed at Manchester, promises to deliver low-emittance and low temperature beams through the cooling of the electron source using magneto-optical trapping [1, 2]. It offers advantages over conventional magneto-optical trapping techniques through the AC magnetic field, such that there are no residual fields due to eddy currents persisting after the trapping cycle has ended. As such, the trajectories of electrons extracted from the AC-MOT are unaffected by stray external fields resulting in a more reliable electron source with potentially higher beam quality.

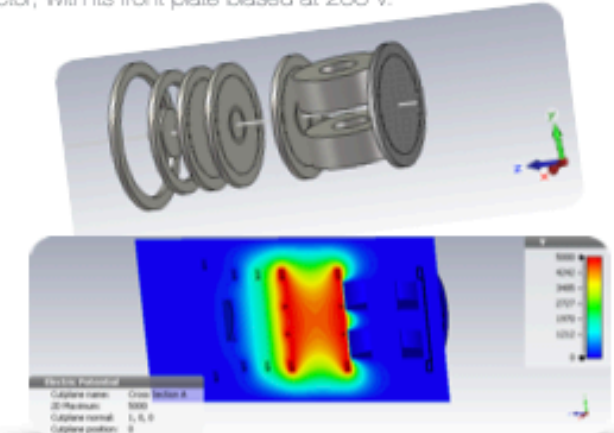


Cold Atom Trap Based Electron Source The University of Manchester

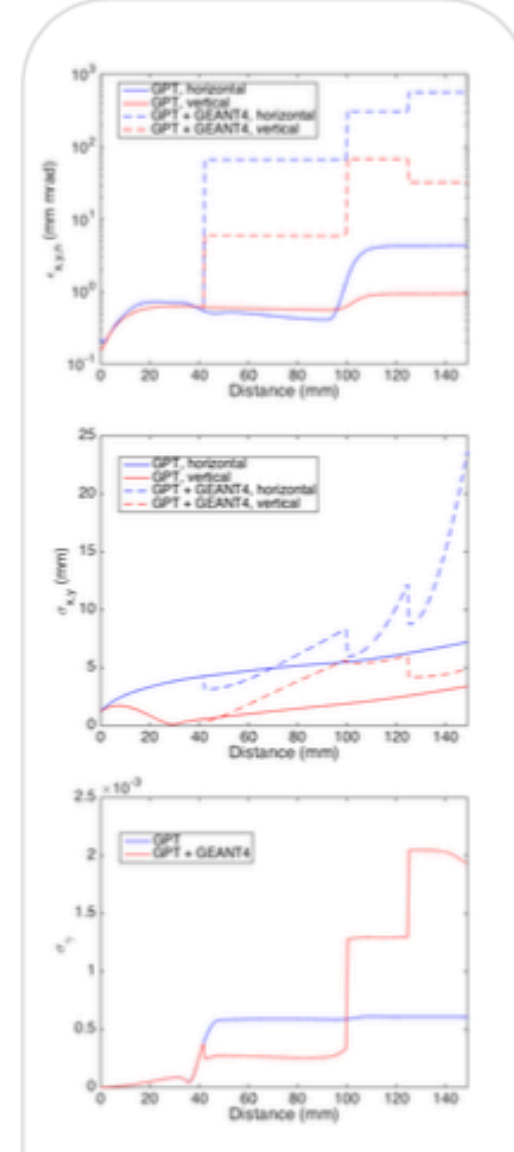


**FIGURES** An example to particles scattering through the woven mesh with various wire diameters simulated with GEANT4.

**EXTRACTION REGION** The atoms in the MOT are ionised and the electrons are extracted using a series of electrostatic electrodes towards the diagnostic section (or later an electron diffraction experiment or injection into a FEL). A full description of the AC-MOT in this experiment can be found in [1]. After passing through the grounded MOT field coils, the electrons pass through three electrodes connected to 5 kV power supplies, which provide the extraction fields. An electrode is constructed of a stainless steel ring covered with a fine mesh, designed to support the fields but allow electron transmission. The three electrodes are followed by the Microchannel Plate (MCP) detector, with its front plate biased at 200 V.



**PARTICLE TRACKING** Particle tracking through the extraction region was performed by using General Particle Tracer (GPT) [4] with 3D field maps extracted from CST. The choice of tracking tool is dictated by the need to model correctly low energy transport through electromagnetic fields and an efficient space-charge model to correctly include the intra-bunch forces in the ultra-low-energy beam. GPT is used for this purpose. A focus of the current design work presented in this paper is the impact of low energy electron scattering in the meshes used to support the electric fields - in this work the scattering model in GPT is replaced by a more accurate scattering model of GEANT4, to give a realistic estimation of the emittance growth from elastic scattering in the meshes. So in this paper, the effect of the beam-mesh interaction was investigated with a coupled tracking tool of both GPT and GEANT4 [5, 6], with the fields produced in CST, ensuring the electron-mesh interaction is performed according to the interaction differential cross sections. Practically the code coupled is realised with a series of helper scripts, handling coordinate and unit translation at every mesh encountered by the GPT tracking.



**FIGURES** Reconstructed rms values for various observables along the beam axis using GEANT4 and GPT combined tracking.

**CONCLUSIONS** A technique combining the GEANT4 and GPT codes in order to simulate the non relativistic electrons undergoing acceleration under static electric fields in the Manchester-Cockcroft AC-MOT and scattering through fine mesh structures is presented. The aim is electron transport from the Manchester-Cockcroft AC-MOT to an MCP with controlled emittance growth. We show that the emittance growth of a realistic beam is very high with the existing experimental setup and propose a solution to preserve the emittance through extraction geometry optimisation. We are also commissioning the experiment in Manchester, with one of the goals to benchmark these simulations.

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 [6] J. Allison et al., IEEE Trans. on Nuc. Sci. 53, 1, p270 (2006).  
 [7] T.T. Bohlen, et al., Nuclear Data Sheets 120, 211-214 (2014) and A. Ferrari, et al., CERN-2005-10 (2005), INFN/TC\_05/11, SLAC-R-773.



2016

The University of Manchester

MANCHESTER 1824

Lancaster University

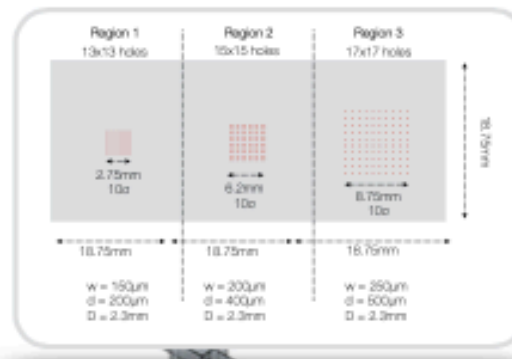
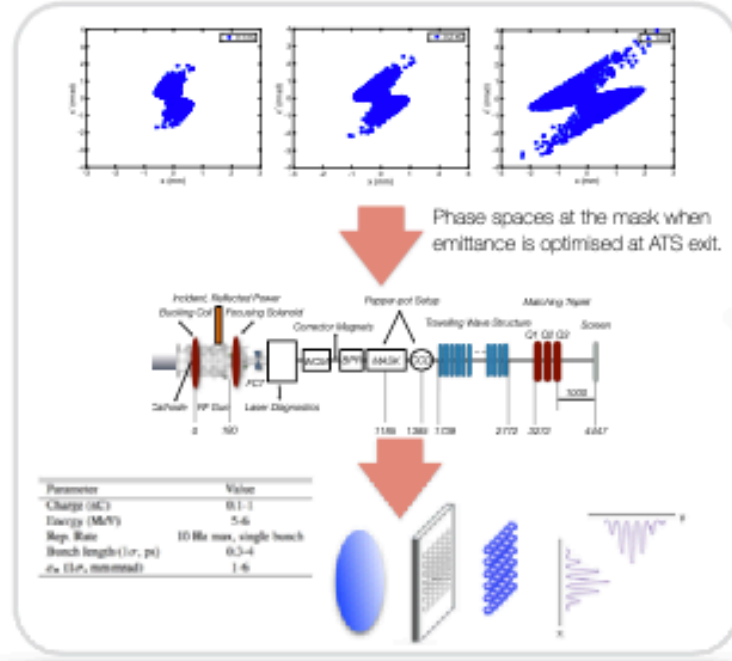
REVIEW OF EMITTANCE DIAGNOSTICS FOR SPACE CHARGE DOMINATED BEAMS FOR AWAKE e-INJECTOR

O. Mete Apsimon<sup>1</sup>, G. Xia<sup>2</sup>, S. Doebert<sup>1</sup>, C. Welsch<sup>3</sup>

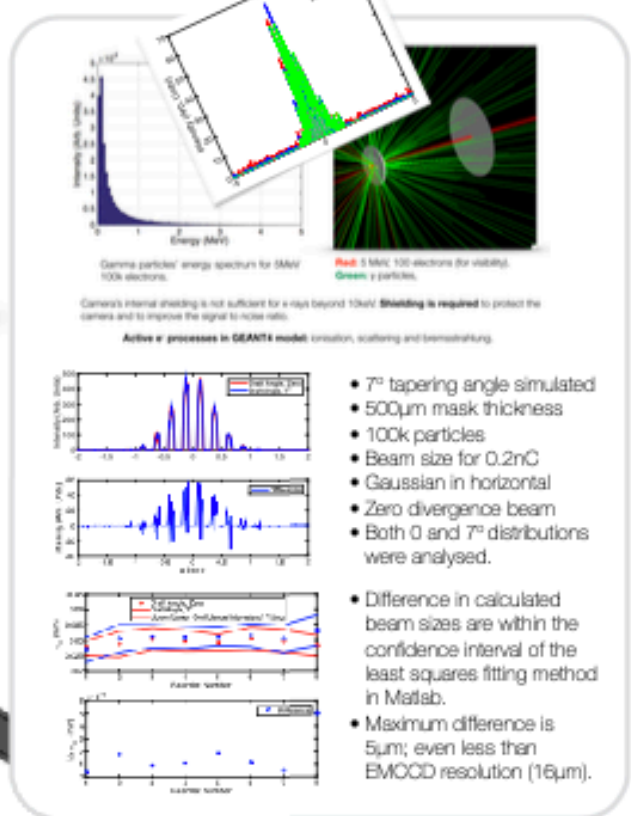
The University of Lancaster<sup>1</sup>, The University of Manchester<sup>2</sup>, The University of Liverpool<sup>3</sup>, The European Organization for Nuclear Research, CERN<sup>4</sup>, The Cockcroft Institute for Accelerator Science and Technology<sup>5</sup>

ABSTRACT For a low energy, high intensity beam, total beam emittance is dominated by defocusing space charge force. This is most commonly observed in photo-injectors. In this low energy regime, emittance measurement techniques such as quadrupole scans fail as they consider the beam size only depends on optical functions. The pepper-pot method is used for 2D emittance measurements in a single shot manner. In order to measure the beam emittance in space charge dominated regime by quadrupole scans, space charge term should be carefully incorporated into the transfer matrices. On the other hand, methods such as divergence interferometry via optical transition radiation (OTR), phase space tomography using 1D projections of quadrupole scans can be suitably applied for such conditions. In this paper, the design of a versatile pepper-pot system for AWAKE experiment at CERN is presented for a wide range of bunch charges from 0.1 to 1nC where the space charge force increases significantly. In addition, other aforementioned methods and respective algorithms are introduced as alternative methods.

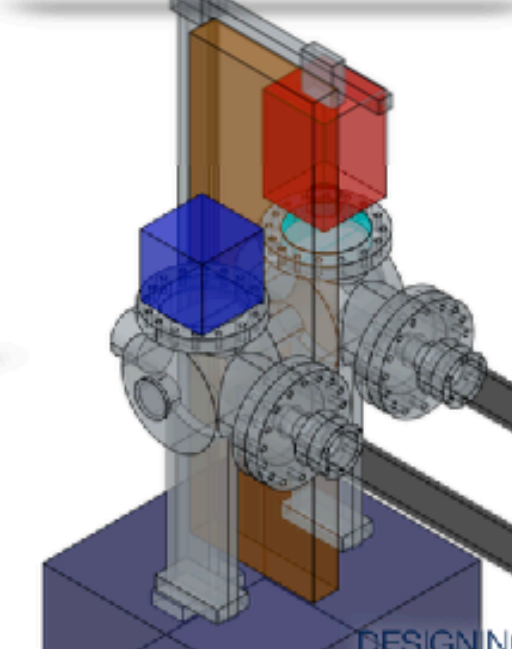
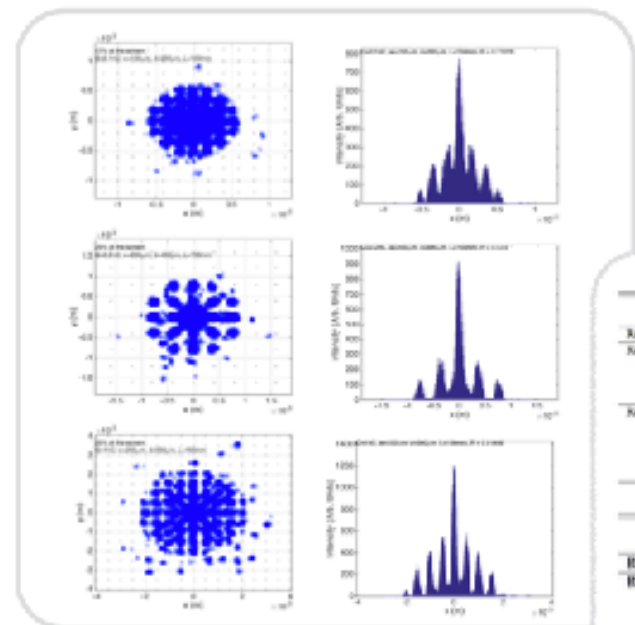
PEPPER-POT METHOD



GEANT4 STUDIES



RESULTS



DESIGNING THE GEOMETRY

Table with columns: Charge (nC), r', a, r, r', r', r', r', r', Transmission. It contains data for three regions and a total row.

Equations: R' < 1, emittance dominance over space charge; R' = (2I / gamma^2 I\_0) \* (omega L / delta E\_n); L\_s = E / (dE/dt) approx E(MeV) / (1.5(MeV cm^-2 s^-1) rho(g cm^-2)); Delta r' < a; sigma = L \* r' / a; Prevent beamlets from overlapping on the screen.

CONCLUSIONS A pepper pot monitor for emittance measurement of beams with significant space charge was designed for the AWAKE experiment...

ACKNOWLEDGMENTS This work was supported by the Cockcroft Institute Core Centre and STFC. Authors also thank to Dr Craeme Durr for his support...

REFERENCES [1] U. Sarini Phys. Rev. Lett. 61, 1635 (1988); [2] M. Zhang Fermilab-TN-1683 (1986); [3] P. Picot et al. PAC04 Proceedings, p.2201, (1987); [4] S. G. Anderson PRSTAB 6, U 4.2.1 (2002); [5] L. M. Young, A. J. R. 96-1185 (2000); [6] http://uk.nslworks.com; [7] A. Calvetti et al., CERN-SPSC-2013-015 (2013); [8] O. Bracco et al. WERM/C19, these proceedings; [9] K. Poomsa et al. PRSTAB 16, U22501 (2013); [10] J.G. Power et al. Rev. Sci. Instrum., 69, 3, 1285 (1998); [11] D. Stratakis et al. PRSTAB 6, U 1.2.201 (2002); [12] Private communication with Dr R. Forth.

ALTERNATIVES A Otrra transition radiation (OTR) is widely used for beam profile measurement. Analysis of the far field distribution of interfering OTR from two circular radiating screens (foils) provides information on beam divergence. Beam size can be measured simultaneously from the near field pattern using a beam splitter to obtain (x, x') and (y, y') pdfs. Comparably the lower limit of divergence measurement is given as 0.01/|gamma| [2] where gamma is the relativistic Lorentz factor; upper measurement limit depends on the experimental setup. The resolution for the beam size depends on the resolution of the camera and the magnification. Once at least two such data are obtained, the algorithm in [9] can be used to calculate the emittance. One can benchmark the OTR results against phase space tomography. Tomography in transverse phase space can be performed using the 1D beam projections acquired from a sufficient number of beam profiles, to scan from 2 to 130 degrees for different quadrupole settings. A 2D map can be reconstructed by using these 1D projections using the filtered back-projection algorithm that takes into account the space charge [11]. A study to modify the transverse matrix to include a space charge term and hence correct the quad scan method for high intensity, low energy applications is being carried out.



2017

# Trivia time

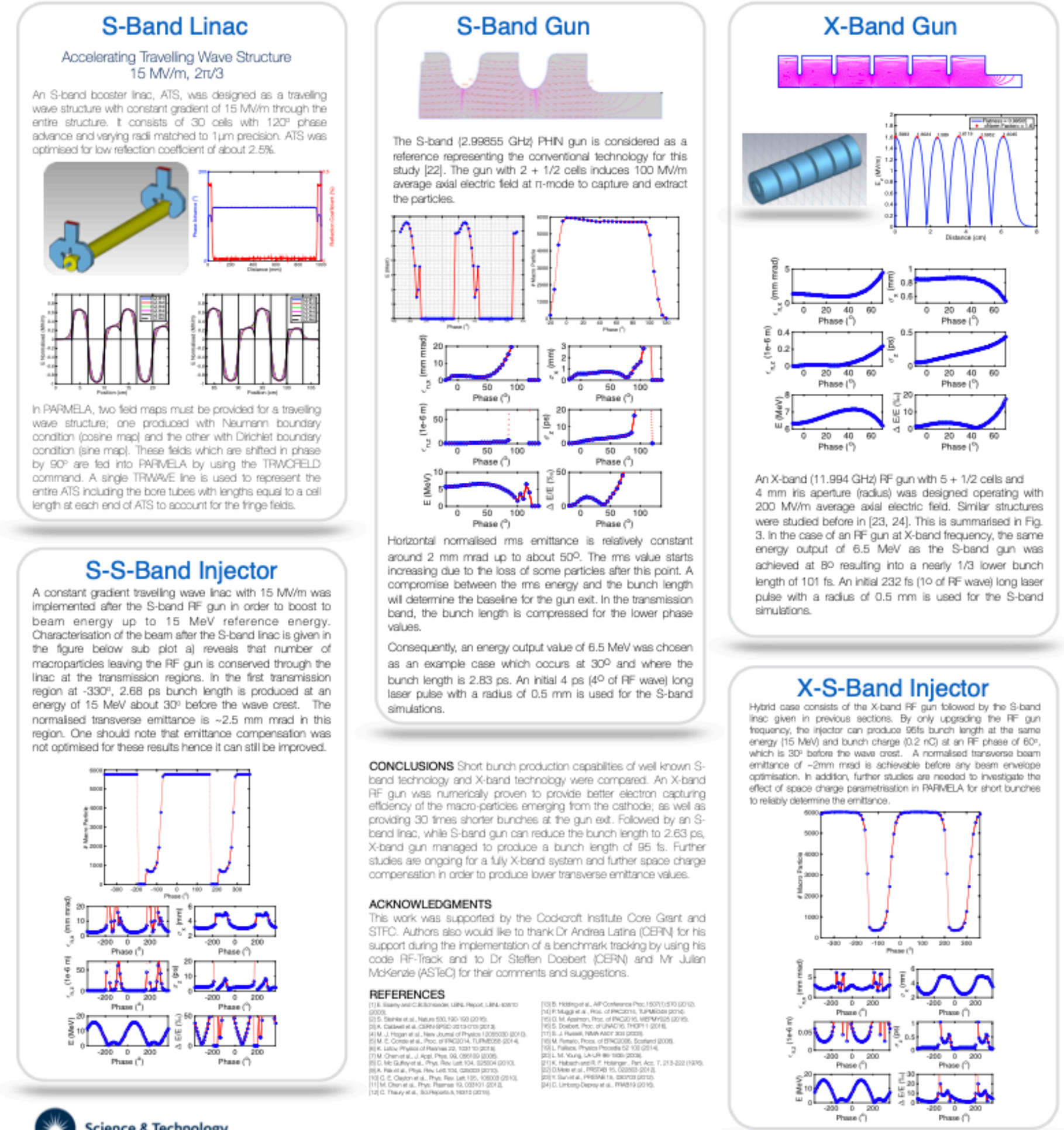
- Do not put too much text in your posters (I do it, too!)
- Visually attractive to kindle a conversation,
- Have printouts of your proceedings for more info,
- Do not have many posters to present, enjoy networking aspects of a conference, too,
- Do not reveal results that you will publish in a journal as some high impact journals requires embargo until they publish
- Consider conference special editions of journals, such as PRAB.

**ABSTRACT** Applications of plasmas in accelerators benefit from short probe bunches comparable to plasma wavelength due to currently achievable plasma wake profiles. In plasma acceleration case, high capture efficiency within a narrow energy spectrum can be achieved when a sub-picosecond to femtosecond witness bunch injected behind the driver pulse at the high electric field region. A start-to-end simulation study was performed for parametric optimisation of an rf photoinjector to provide a short witness bunch for plasma applications in accelerators. An rf photoinjector is a laser-driven, high brightness and robust electron source that can provide stability and flexibility provided by today's advanced laser and rf technologies.

**INTRODUCTION** Laser pulses (LWFA) [1, 2] or high quality short particle beams (PWFA) [3-5] are used in order to drive the plasma electrons to induce high wake fields in the plasma. LWFA occurs under the effect of the ponderomotive force of the laser pulse whereas PWFA utilises the Coulomb force between the driver beam and the plasma electrons. For PWFA the resulting wakefield strength is inversely proportional to the square of the driver bunch length. Such bunches can be injected into the plasma from an external source or can be formed inside the plasma by modulation at the plasma frequency thanks to a phenomenon called self modulation instability (SMI) [6].

As well as the driver beam, the witness or the probe beam can be generated either from an external source or from the plasma itself using schemes such as ionisation injection [7-13]. There are also studies on using an LWFA as an injector for a secondary plasma channel for acceleration [14]. Magnetic undulators can also be used to microbunch an initial beam to produce a train of ultra-short bunches. A previous study demonstrated wakefield build-up as a result of such a train when compared to a single bunch case [15]. The initial quality and characteristics of a beam coupled to plasma components will aid the suitability of the final beam for the applications such as FELs or future collider design studies.

This paper discusses the production of sub picosecond electron beams from a photoinjector using conventional S-band and X-band RF structures to have hybrid frequency gun-linac layouts [16] operating at off-crest phases.





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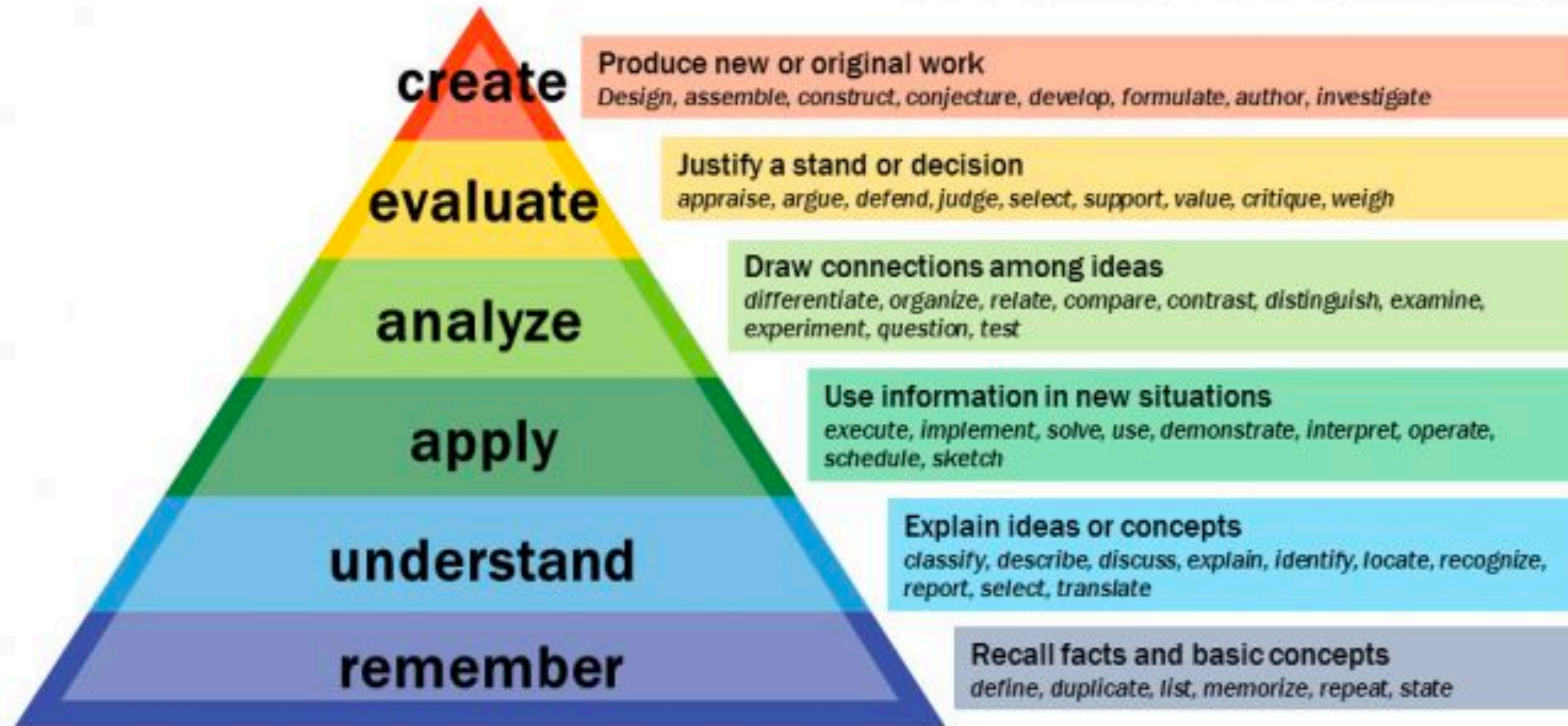
Before disseminating your research...



# Conception of an idea

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## Bloom's Taxonomy





# Conception of an idea

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- Know your field (literature to date)
- Identify missing links
- Set SMART goals

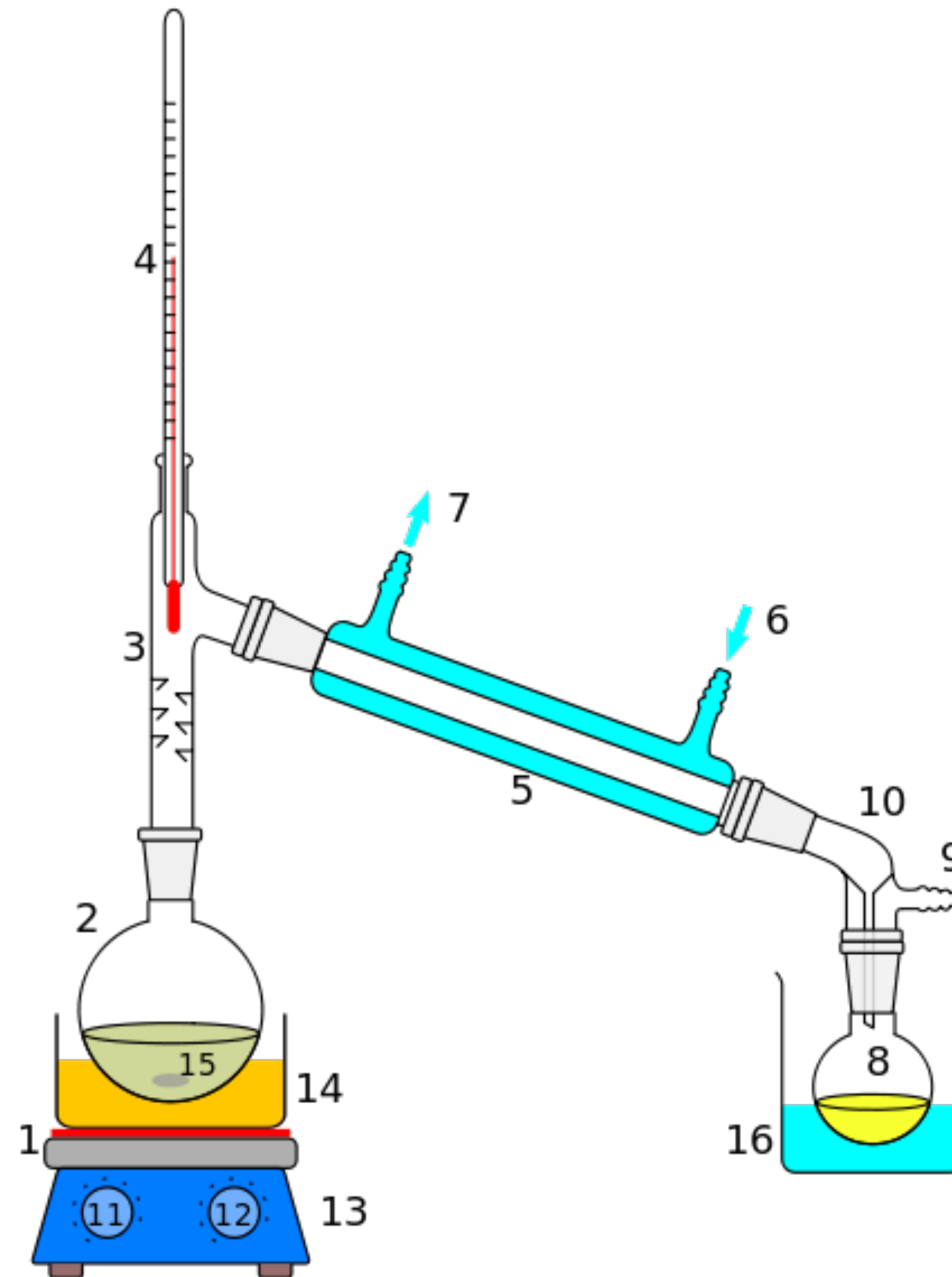
Specific

Measurable

Achievable

Relevant

Time-bound





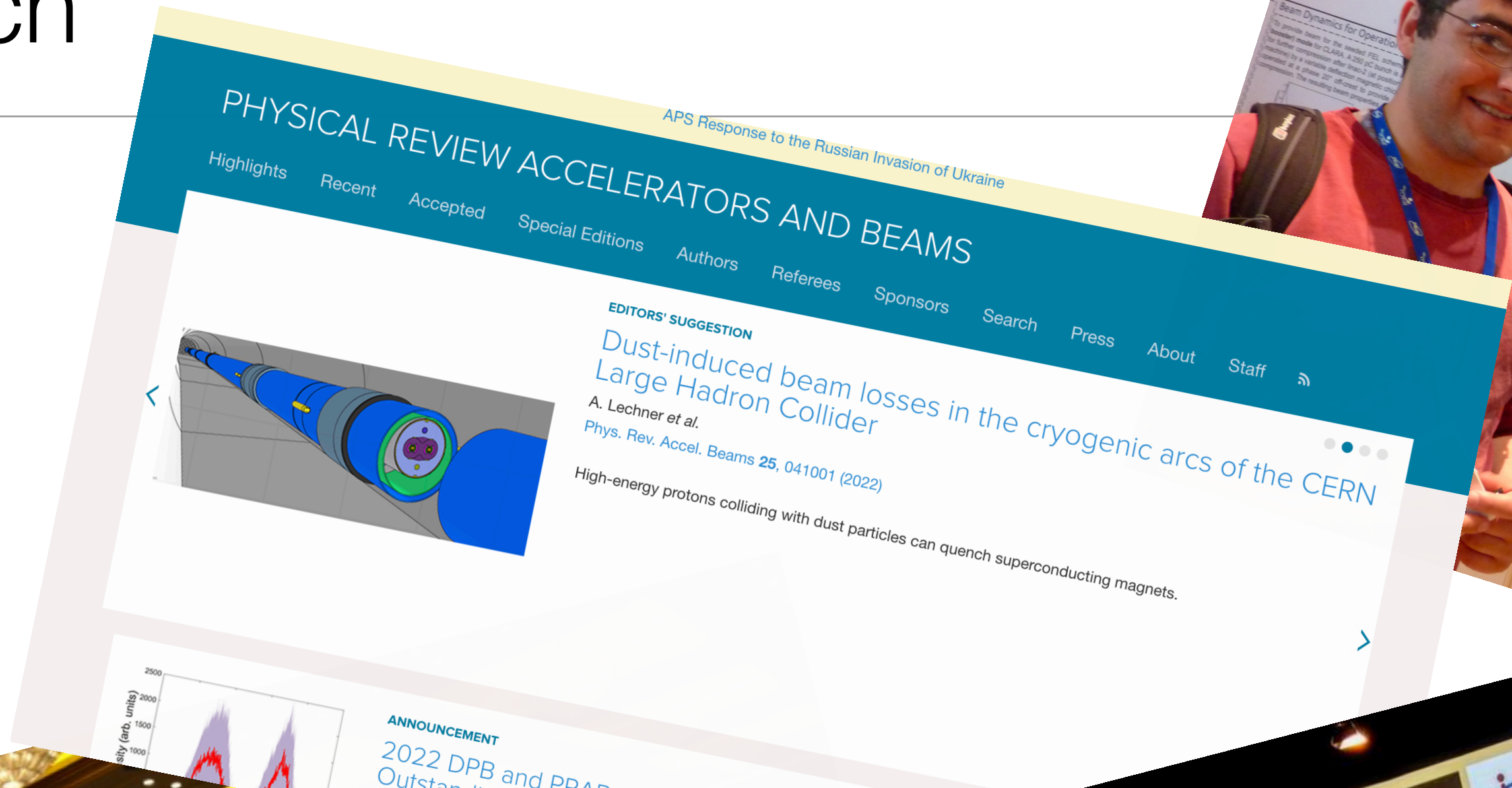
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Once you distilled your arguments...



# Scholarship of research

- Peer review
- Dissemination
- Collaboration
- Networking



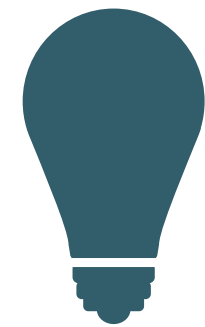


# Expressing your research

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- Motivation
- Arguments
- Result
- Methods
- Conclusions
- **Not in this order. Where would you start?**

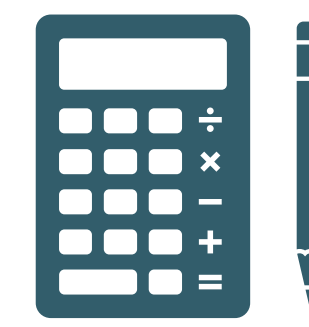
Think



Plan



Do



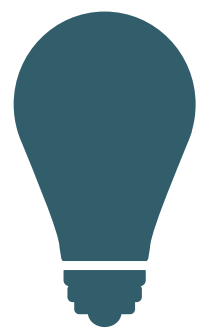


# Expressing your research

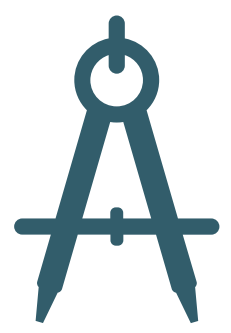
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- Motivation 3
- Arguments 2
- Result 1
- Methods 1
- Conclusions ?

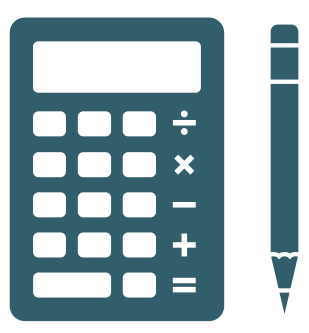
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Plan



Do



• **Not in this order. Where would you start?**



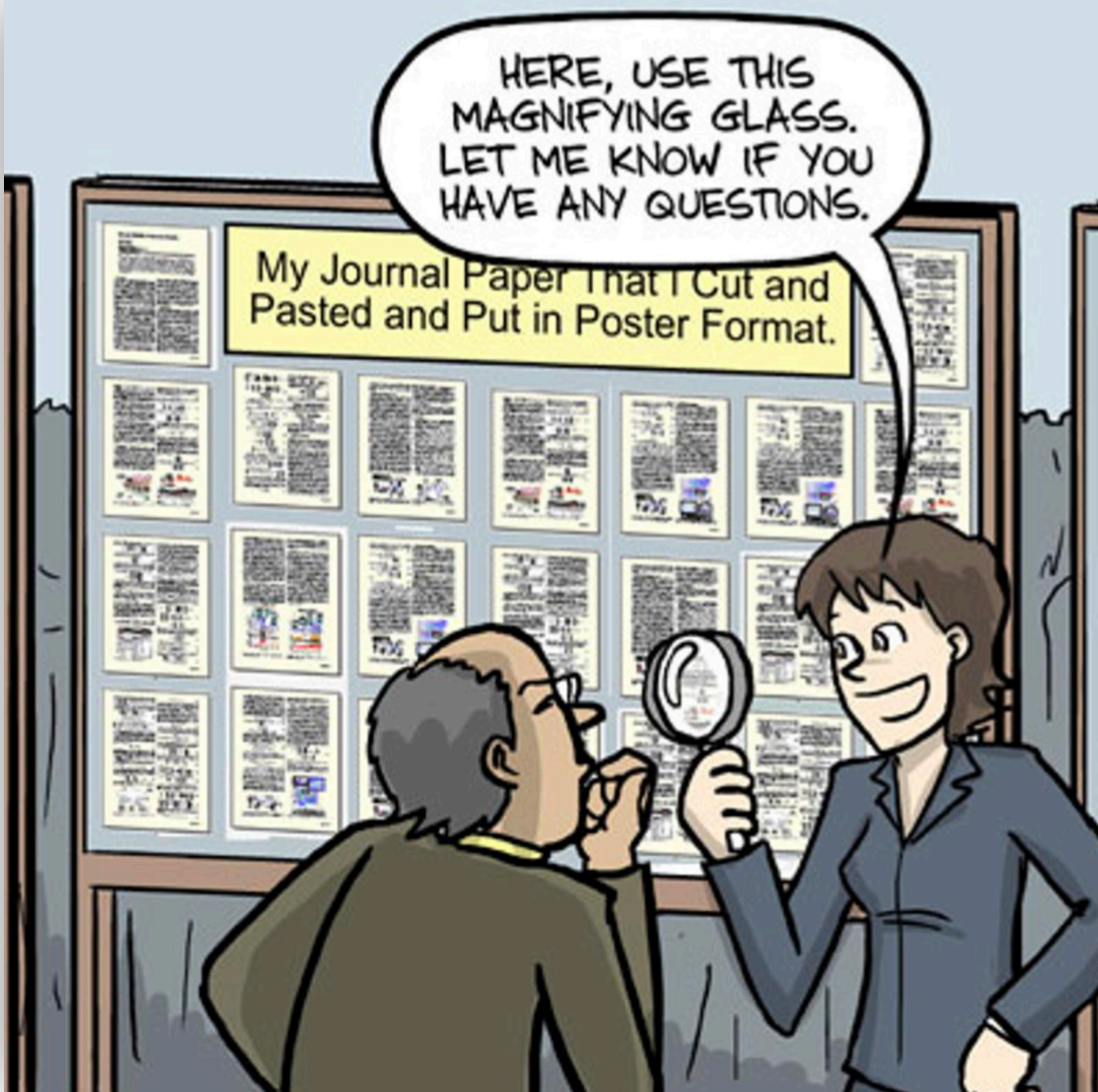
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Let's go to a conference now...



# Preparing a good conference poster

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## Introduction

- ▶ 19.4% of the US population speaks a language other than English at home and 8.6% has limited English proficiency (LEP)
- ▶ LEP patients suffer from limited access to care, receive poorer quality care, and are less likely to understand and adhere to care plans involving medications
- ▶ As a result, language assistance services (LAS) have been developed to help the pharmacy profession address these barriers

### Terminology

**Interpret:** facilitate verbal communication for individuals who speak different languages

**Translate:** change written documents from one language to another

## Objective

The purpose of this study was to determine the utilization of and barriers to accessing language assistance services (LAS) in community pharmacies for limited English proficiency (LEP) patients

## Methods

- ▶ A 34-item survey was administered to assess LAS use and attitudes among a national sample of 500 chain and 500 independent community pharmacists
- ▶ Four mailings (i.e. pre-notification, survey, reminder, and replacement survey) were developed based on Dillman's Tailored Design Method
- ▶ Descriptive statistics were used to summarize the results and inferential statistics were used to measure for associations

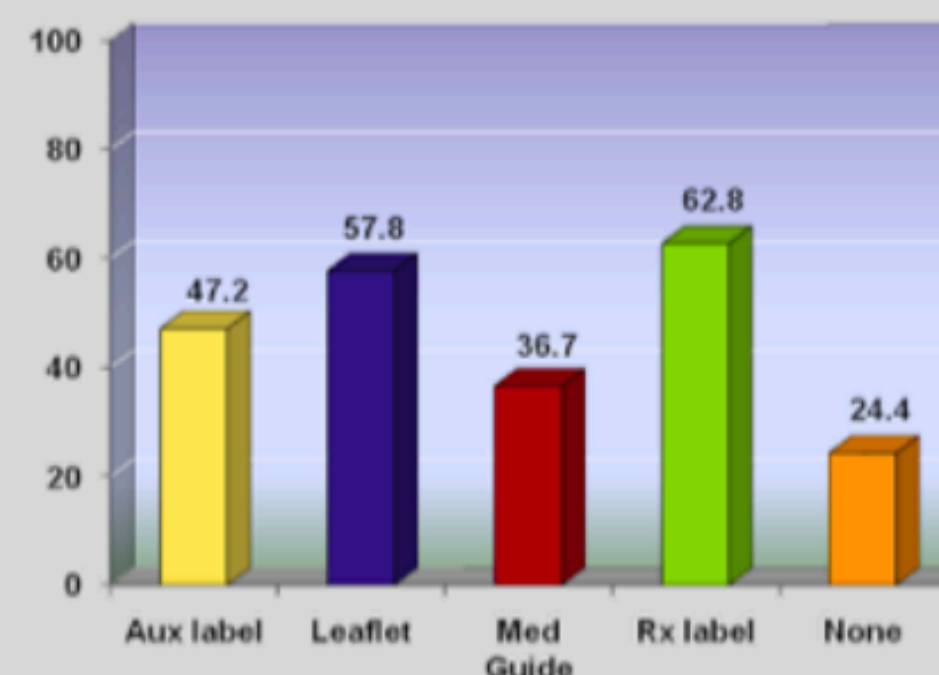
## Results

- ▶ 296 surveys were completed and 26 were returned for a response rate of 30.0%
- ▶ Demographics: 63.1 % of responders were male, 36.9% were female; 44.9% independent and 55.1% chain pharmacists; 91.0% listed English as best language

Table 1. Most commonly requested

Written	Verbal
Spanish	Spanish
French	French
Vietnamese	Vietnamese
Chinese	Chinese
Polish	Italian

Figure 1. Written parts that can be translated (%)



## Results – Summary of Challenges

- ▶ 52.8% of pharmacists with LAS do not notify patients about its availability
- ▶ A third of pharmacists (31.7%) report they do not have written LAS capabilities (e.g. Rx labels)
- ▶ Half (52.2%) of all surveyed are concerned about inaccuracies in translations/interpretations
- ▶ 23.9% of pharmacists believe LAS take too much time
- ▶ 21.4% are concerned about legal issues



## Conclusions

- ▶ Substantial barriers to optimal LAS use exist including availability, awareness, and efficiency of tools
- ▶ A disconnect between pharmacists and patients about LAS is also an obstacle to navigate; next step in research plan is to survey consumers
- ▶ Automated LAS kiosks, natural language processing, and use of social media are all tools that pharmacies may employ to improve LAS

# Preparing a good conference poster

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- **The good:**

- ◉ Nice use of bullets
- ◉ Not too text heavy
- ◉ The columns are aligned to guide the reader to read vertically
- ◉ The title is written using a good format (not all caps)
- ◉ Sans-serif fonts

- **The bad:**

- ◉ The grey textbox background gives the poster a dull look
- ◉ The list of universities and icons in the title block look cluttered
- ◉ There is no reference section
- ◉ The overall colour scheme is not the most pleasant
- ◉ The middle column is not centred
- ◉ Textbox outlines or wider margins would better separate the text from the background
- ◉ The 3D graph would be better as a 2D
- ◉ Section titles are not justified consistently
- ◉ Figure captions are above the figures, and some even lack one.



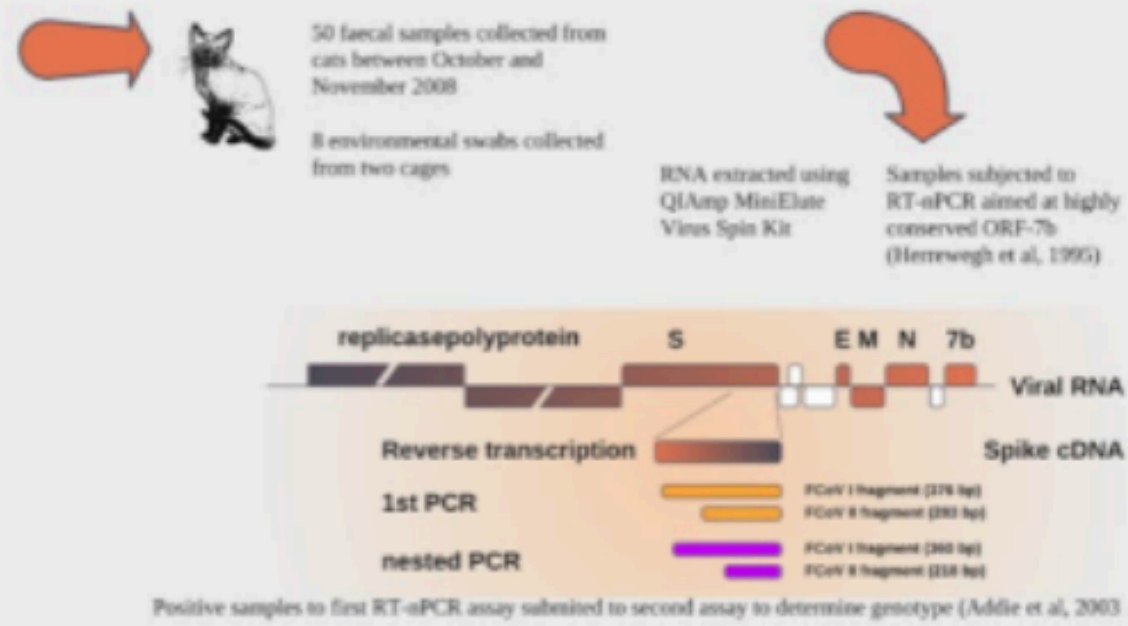
# Genetic characterisation of coronaviruses in shelter dogs and cats in Lisbon

Ricardo C. Rosado<sup>1</sup> (rcrosado@gnail.com), Ana Duarte<sup>1</sup>, Augusto Baptista<sup>2</sup>, Filomena Oliveira<sup>1</sup>, Ana Machado<sup>1</sup>, Leonel Fernandes<sup>1</sup>, Luís Tavares<sup>1</sup>  
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## Introduction

Coronaviruses (CoV) are classified into three different antigenic groups. Group 1 includes both canine (CCoV) and feline coronaviruses (FCoV) and group 2 includes the recently recognized canine respiratory coronavirus (CRCoV). CCoV has been further classified into two genotypes, I and II, the first with high genetic similarity with FCoV. Both genotypes are responsible for the occurrence of enteritis in dogs, which can be fatal when associated in mixed infections with canine parvovirus (CPV), especially in younger dogs. FCoV have different classifications according to genotype and biotype. Due to their serological and genomic features FCoVs are classified as types I and II, where type I is strictly feline while type II resulted from a recombination event between FCoV and CCoV. FCoVs can be further classified into two biotypes. The enteric biotype (FECV) is present ubiquitously in cat populations, causing mild diarrhoea. The other recognized biotype of FCoV causes a lethal disease, feline infectious peritonitis (FIPV). This form with higher virulence only develops in a small percentage of animals, usually during primary infection and in kittens. The emergence of human coronavirus (SARS) has incited renewed interest in coronaviruses, and serological and virological investigations have reported worldwide presence and prevalence of these viruses in both domestic, as well as in free-roaming stray or feral dogs and cats. This knowledge is especially relevant in kennel and animal shelters. To investigate the genomic diversity of FCoV and CCoV in Lisbon's Municipal kennel, a virological survey was conducted which included canine distemper virus, canine and feline parvovirus, canine and feline coronavirus, feline immunodeficiency virus and feline leukaemia virus. All coronavirus positive samples were further characterized to assess the presence of different FCoV and CCoV genotypes within the animal population.

## Materials and methods



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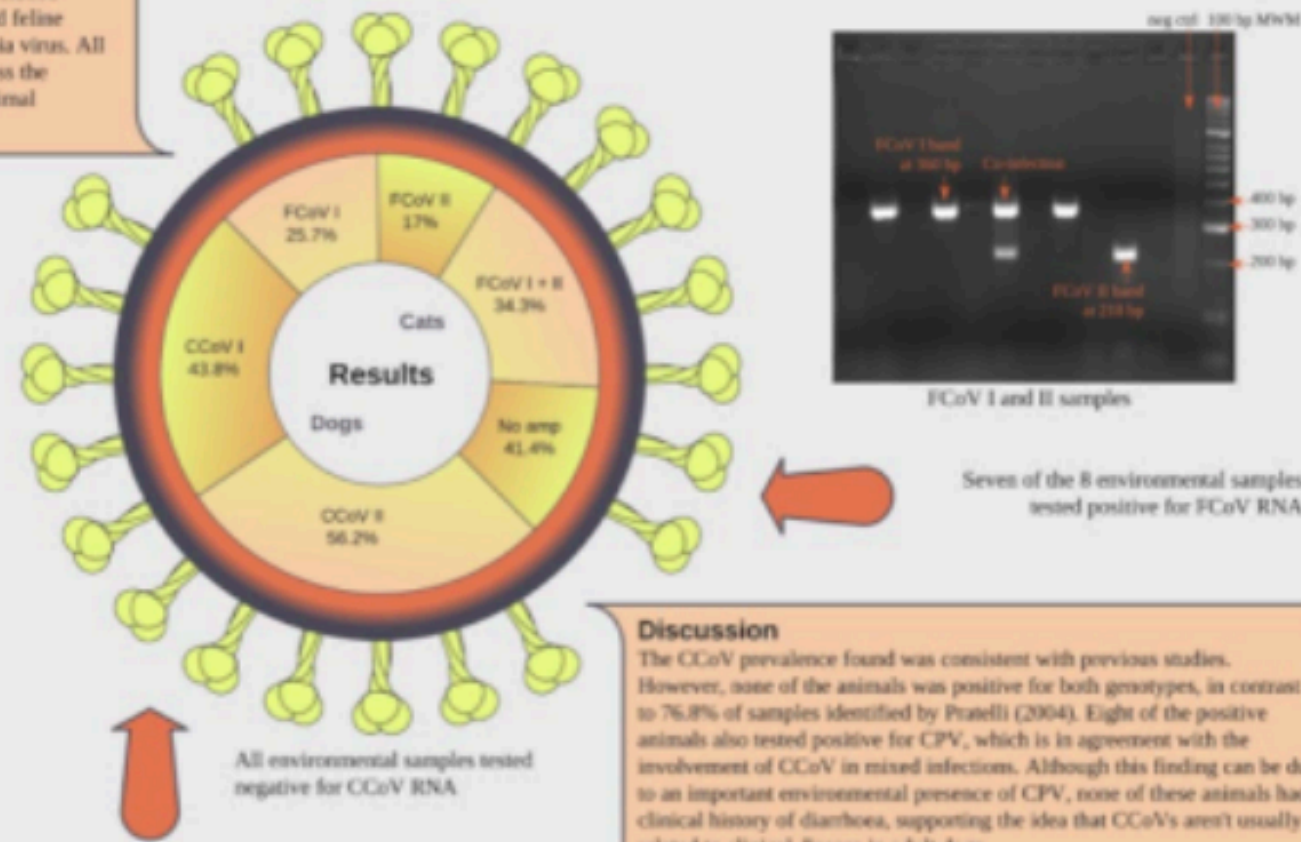


49 faecal samples collected from cats between October and November 2008

16 environmental swabs collected from four cages

RNA extracted using QIAmp MiniElute Virus Spin Kit

RT-PCR assay using different forward primers and common reverse primer to determine CCoV genotype (Pratelli et al., 2004)



## Discussion

The CCoV prevalence found was consistent with previous studies. However, none of the animals was positive for both genotypes, in contrast to 76.8% of samples identified by Pratelli (2004). Eight of the positive animals also tested positive for CPV, which is in agreement with the involvement of CCoV in mixed infections. Although this finding can be due to an important environmental presence of CPV, none of these animals had clinical history of diarrhoea, supporting the idea that CCoVs aren't usually related to clinical disease in adult dogs. Regarding FCoV, the prevalence found was higher than reported in other countries and significantly higher than previously found in stray cat population in Portugal (Duarte et al., Submitted). The large number and heavy rotation of animals in the Municipal kennel makes it difficult to implement an efficient sanitization procedure and the presence of viral nucleic acid in the environment caused by this could be responsible for this high prevalence. Previous studies in Portugal concerning the distribution of FCoV genotypes showed a higher prevalence of FCoV type I among domestic cats (Duarte et al., 2009). Among the animals in our study we found similar prevalences for FCoV I and II and yet the percentage of co-infection within the same animal was higher than previously reported. Unfortunately we have no available data to correlate these results with the presence of the FIPV biotype. The high prevalence of coronavirus infection found in both dogs and cats in the Lisbon Municipal Kennel allowed the viral genetic characterization, showing a high rate of co-infection with both genotypes of FCoV and absence of co-infected animals with CCoV I and II. However further investigation is needed in order to maintain a molecular epidemiological surveillance and help identify further CoV strains, as well as understand the pathogenic potential of these viruses.

## Acknowledgements

This work was sponsored by CISA-FMV as part of the Integrated Master Degree in Veterinary Medicine. We are grateful to our colleagues and all the employees of the Lisbon Municipal Kennel for their collaboration and assistance in the collection of biological samples.

## References

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# Preparing a good conference poster

## The good:

- Acknowledgements and references have their own section at the bottom
- Logos are at the bottom

## The bad:

- Overall disorganised look
- Difficult to know which way to read this poster
- Title font is too large compared to rest of the text
- Images blend together and thus hard to interpret
- No consistency between section: some sections are in text boxes and others are not
- The dark backgrounds for the title block and references draw your eye away from the body of the poster.



**SIZING UP THE CRAB INVADERS!**  
 Morphometrics for *Carcinus* spp. can assess population variability & may assist with species identification

René Campbell<sup>1</sup>, Sabine Dittmann<sup>1</sup>, Michael Gardner<sup>1</sup>, Marty Deveney<sup>2</sup>

**CRUSTACEAN DOMINATION**  
 European shore crabs - some of the most widespread marine invasive species worldwide. Two species in the genus:  
*Carcinus maenas* (Atlantic) & *C. aestuarius* (Mediterranean)

**WHICH CRAB IS WHICH?**  
 Taxonomy & population biology: may assist management  
 Morphometrics: quantitative analysis of shape & form  
 Can assess taxonomic ID & local population variability

**MEASUREMENTS**  
 Measurements: Digital callipers used for morphometrics  
 Species ID: Carapace ratios can help identify species (based on previous literature)  
 Population: Multivariate analyses for morphometrics between regions & sex assessed

**CRAB COLLECTION**  
 Field sites: Coast of Gulf St Vincent, South Australia  
 Habitat regions: Rocky shore/estuary, port & mangroves  
 Specimens: Crabs collected with baited traps & time searches  
 Seasonal from 2012 - 2018

**A LOOK AT SOME DATA**  
 924 *Carcinus* measured (CW/CL ratio)  
 Higher proportions of *C. maenas* than *C. aestuarius* ( $p < 0.05$ )  
 Species not certain as female ratios are more variable

**WHAT'S NEXT?**  
 Morphometrics - influenced by sex, so species ID inconclusive  
 Population: Morphology distinct across regions + sex  
 Potential adaptations to habitats + life history (dispersal)  
 Population genetics will be assessed - connectivity & gene flow

**IMPLICATIONS**  
 SA's Mediterranean climate - ideal for *C. aestuarius* establishment, or plasticity for *C. maenas*  
 Habitat use & potential range expansion - concerns for management of this global invader

**ACKNOWLEDGEMENTS:** We would like to thank the Sir Mark Mitchell Research Foundation & the NIMA Board (Aldridge & Mi Lofy) for their financial support in this project. Thanks also to field volunteers, lab technicians & colleagues for their help & for providing feedback on this poster. Design & graphics by René Campbell.

Photo      Catchy main title      Logo  
 Twitter handle      Subtitle and authors      Email

Banner heading #1      Banner heading #2

Figures and text      Figures and text

Banner heading #3      Banner heading #4

Figures and text      **Big crab!**      Figures and text

Banner heading #5      Banner heading #6

Figures and text      Figures and text

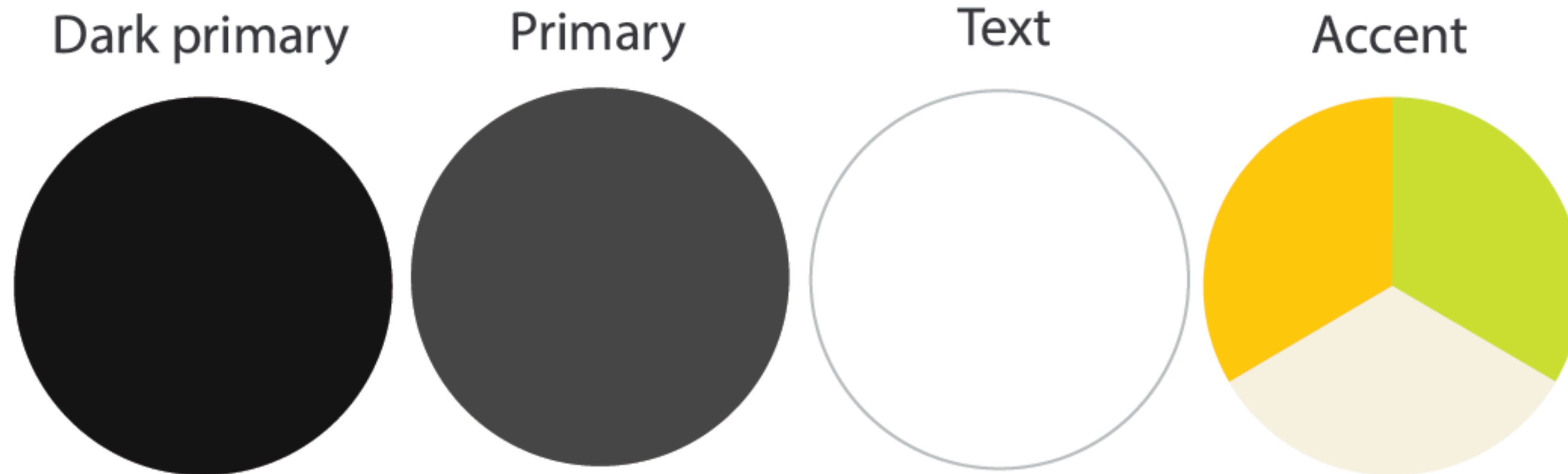
Text      Text

by René Campbell



**Consider using eyedropper tool to create consistent colour scheme.**

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<https://www.animateyour.science/post/best-examples-of-scientific-posters>

# Conclusions after peer engagement

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## **Paper titles we came up with:**

- Performance characteristics of Cs implanted copper
- Catapult acceleration in graphene layers
- 6D beam dyn optimisation for DLA

## **General points**

- avoiding self-promotion
- optimising the content in poster according to how much it will be manned
- how to secure a talk
- preparation to get the most out of expert interaction
- know your audience, aim for appropriate conferences, sign up to newsletter, research professional, google scholar, IoP
- use of social media in conferences and QR codes

## **Wider implications**

- Language, blending in a certain community
- networking, multi-disciplinary interaction
- establishing seminal work