

# Proposal Writing for Vision Scientists: an American Perspective

David Williams

William G. Allyn Professor of Medical Optics  
The Institute of Optics, University of Rochester  
Special thanks to Cindy Gary (U Rochester)  
and Tom Greenwell (NEI)

## Pros of Proposal Writing:

- Essential element for career advancement
- Intensely creative experience
- Scientific roadmap for up to 5 years

## Cons of Proposal Writing:



*Research grant writing in progress.*

# Diversify your funding portfolio:

## Federal:

National Eye Institute

National Science Foundation

Air Force Office of Scientific Research

## Foundations:

Research to Prevent Blindness

Foundation Fighting Blindness

BrightFocus

## Corporations:

Alcon Research Institute



# Opportunities for young investigators

NIH Pathway to Independence Award (K99/R00)

<https://grants.nih.gov/grants/guide/pa-files/PA-20-188.html>

NIH Director's New Innovator Award (DP2)

<https://grants.nih.gov/grants/guide/rfa-files/RFA-RM-19-006.html>

Research to Prevent Blindness Career Advancement and Career Development Awards

<https://www.rpbusa.org/rpb/grants-and-research/grants/grants-for-individuals/career-advancement-award/>

Foundation Fighting Blindness Career Development Award

<https://www.fightingblindness.org/career-development-program-cda>

Sloan Research Fellowship

<https://sloan.org/fellowships>

Pew Biomedical Scholars

<https://www.pewtrusts.org/en/projects/pew-biomedical-scholars/program-details>

Kingenstein-Simons Fellowship Awards in Neuroscience

<http://www.klingfund.org/>

Brain and Behavior NARSAD Young Investigator

<https://www.bbrfoundation.org/grants-prizes/narsad-young-investigator-grants>

# Opportunities for young investigators continued

NSF CAREER Award

<https://www.nsf.gov/pubs/2017/nsf17537/nsf17537.htm>

Air Force Young Investigator Research Program (YIP)

<https://www.wpafb.af.mil/Welcome/Fact-Sheets/Display/Article/842100/afosr-funding-opportunities-special-programs/#anchor2>

Packard Fellowship

<https://www.packard.org/what-we-fund/science/packard-fellowships-for-science-and-engineering/about-the-packard-fellowship-awards>

Research Corporation for Science Advancement - Cottrell Scholars

<http://rescorp.org/cottrell-scholars>

Glenn Foundation - AFAR Grants for Junior Faculty

<https://www.afar.org/research/funding/afar-research-grants/>

Beckman Foundation Young Investigators Program

<http://www.beckman-foundation.org/programs/beckman-young-investigators-program-information>

Camille Dreyfus Teacher-Scholar Awards Program

<https://www.dreyfus.org/camille-dreyfus-teacher-scholar/>

# Choose your cycle WAY in advance!

Submission Dates	Cycle I RO1 (new) Feb 5*	Cycle II RO1 (new )-June 5*	Cycle III RO1 (new)- Oct 5*
Review Dates	June/July	October/November	February/March
Council Dates	August/October	January/February	May/June
Earliest Start Date	September/ December**	April	July

\*Renewal/ resubmission dates are one month later

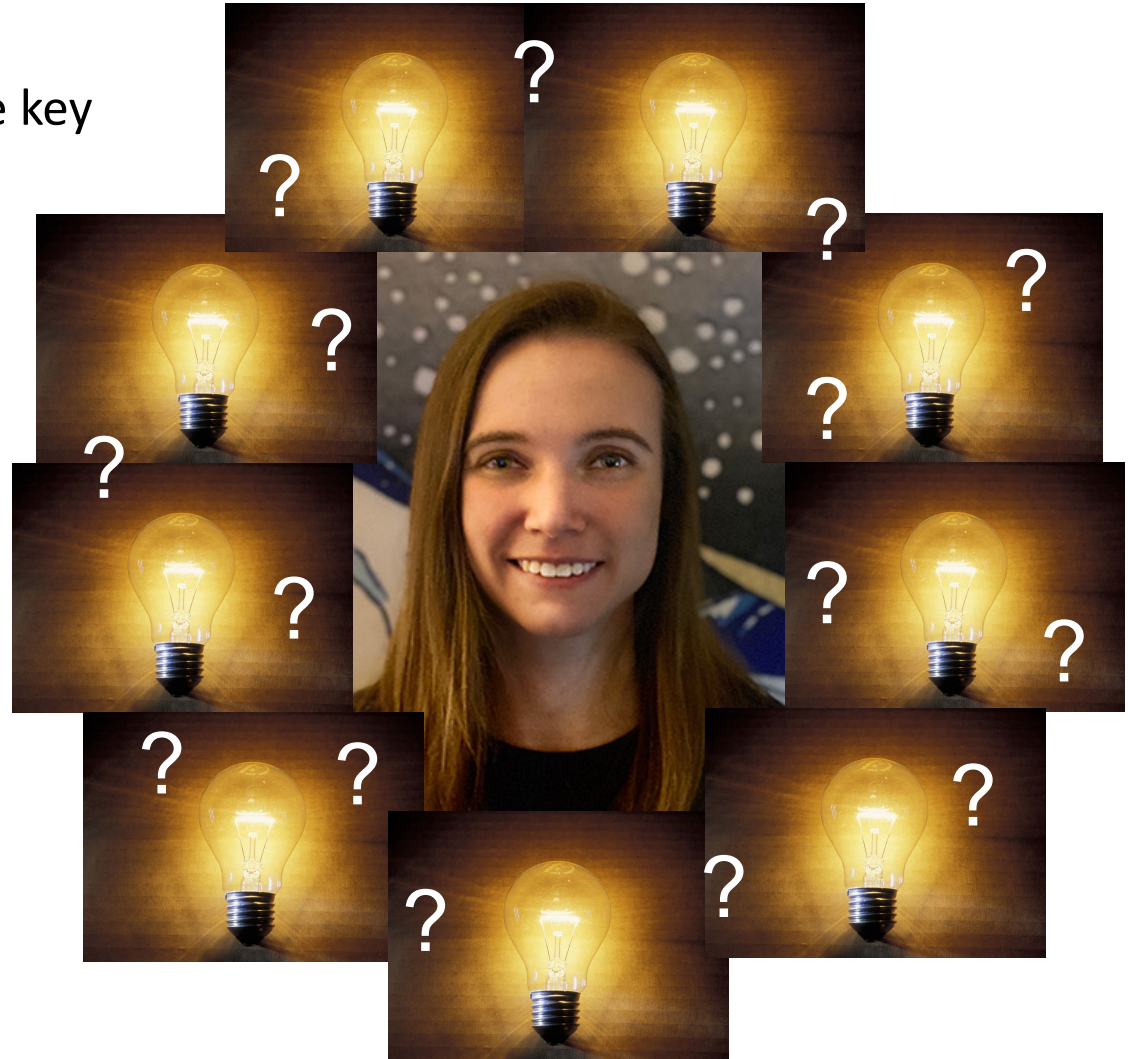
\*\*Earliest start date is just that- earliest and best case scenario- e.g. Dec dates are generally later depending on federal budget

Adapted from:

<http://grants.nih.gov/grants/funding/submissionschedule.htm#review>

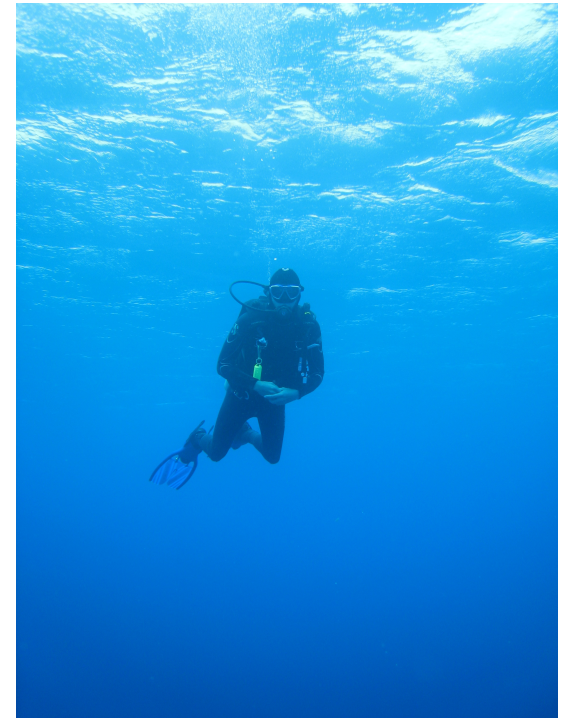
# Choosing the research direction

- You better be excited about it!
- Must fit your skill set
- Novelty and impact are key



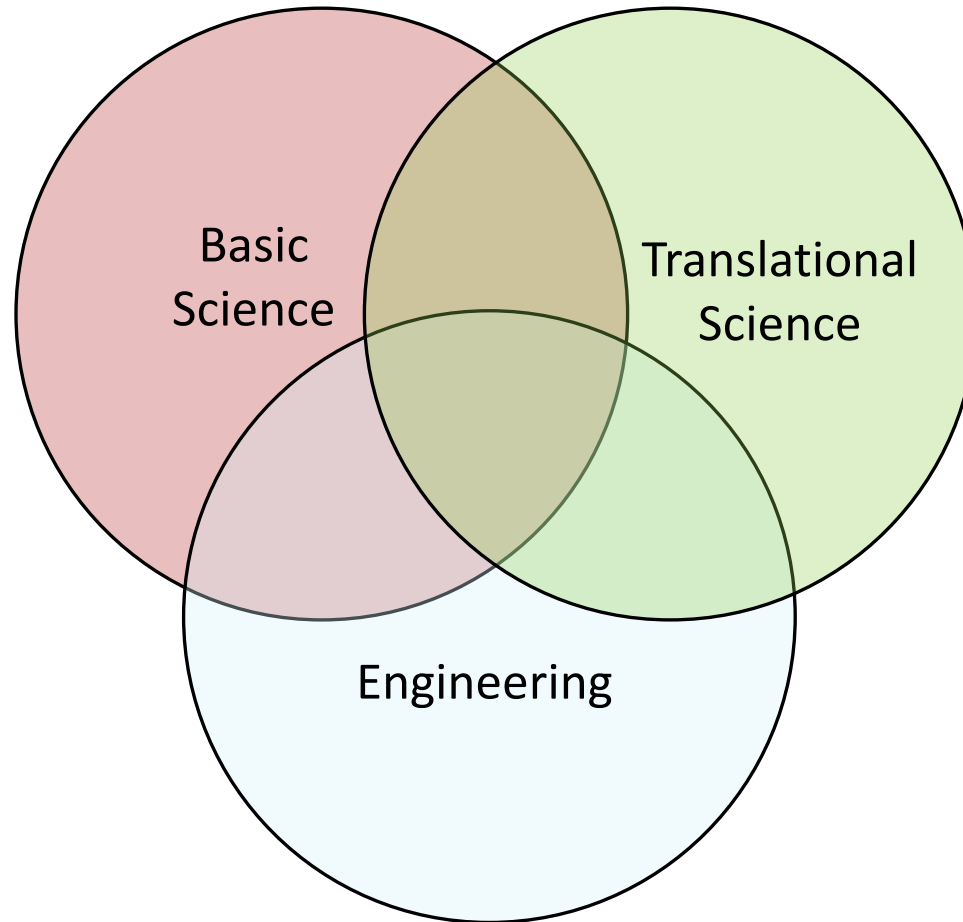
# Managing risk to maximize impact

- Junior investigators are often advised to submit low risk proposals
- Study sections are increasingly risk averse
- Don't undersell impact
- Preliminary data is paramount
- Anticipate reviewer concerns
- Propose low risk alternative approaches





# The more the better!



- Consider adding collaborators to broaden impact
- Opens new multi-investigator, multi-institutional, multidisciplinary funding opportunities

# Major sections of an R01 application

## **Specific Aims (1 page):**

2-4 project goals, ideally thematically linked  
but independent

## **Research Strategy (12 pages):**

- **Significance:** the importance of the problem in context
- **Innovation:** the novelty of your solution in context
- **Approach:** The methods you will use  
including preliminary studies for new applications

# **Use best business practices: your proposal is your product, market it wisely**

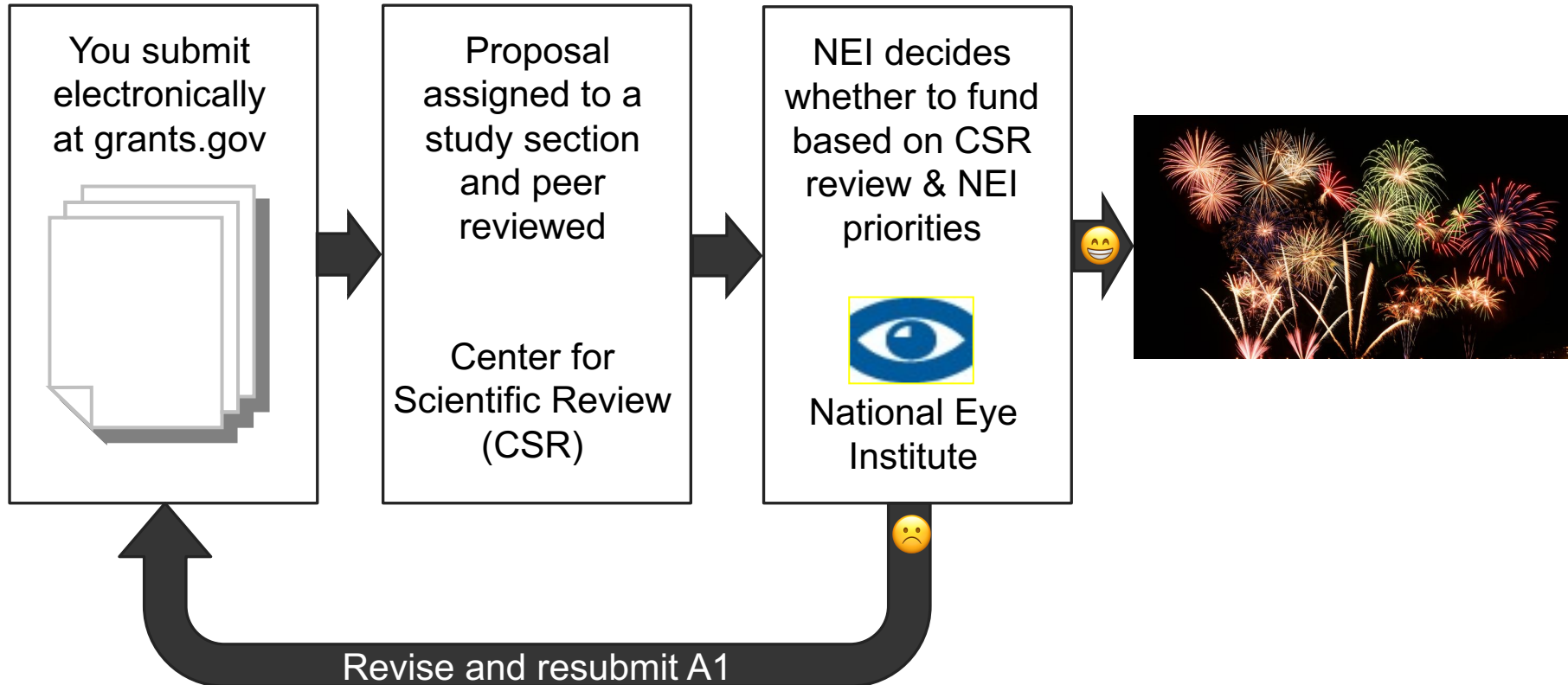
- Superfluous complexity is not your friend
- Know your customer and make their job easy
- Leave time to polish, polish, polish
- Use emboldened headings and bullets, scrub ALL typos
- Leave time to solicit feedback from colleagues before you submit.

# How much money should you ask for?

- Ask for what you need to complete the research
- Justify it thoroughly
- Reviewers can comment on the budget concerns but are asked not to incorporate in their scores.



# The Journey through NIH



## Study sections that review NEI applications

- ▶ BDE: Biology and Development of the Eye
- ▶ PED1 or PED2: Pathophysiology of Eye Diseases
- ▶ NBVP: Neuroscience of Basic Visual Processes (~ 75% are NEI)
- ▶ NTRC: Neurotransporters, Receptors and Calcium signaling (~ 10% are NEI)  
Reviews retinal circuitry and receptor-oriented applications
- ▶ ETTN P-81 (Imaging, Bioengineering or low vision SEP) or BNVT (Bioengineering of Neuroscience, Vision and Low Vision) (~ 10-15% NEI)
- ▶ NCF: Neural Cell Fate
- ▶ NDPR: Neurodifferentiation, Plasticity and Regeneration

20+ members. Study section rosters are available on the NIH website.

## NIH Scoring: Review Criteria and Overall Impact

Typically 50% of applications are discussed

3 reviewers read your application and comment on it

Dynamics of review process have implications

<b>Impact</b>	<b>Score</b>	<b>Descriptor</b>
High Impact	1	Exceptional
	2	Outstanding
	3	Excellent
Moderate Impact	4	Very Good
	5	Good
	6	Satisfactory
Low Impact	7	Fair
	8	Marginal
	9	Poor

# Sample Summary Statement of an Application that was Discussed and Scored

NEI Program  
Officer  
Contact info

**SUMMARY STATEMENT**  
( Privileged Communication )  
Release Date: 04/04/2008  
Revised Date: 01/06/2009

PROGRAM CONTACT:  
BARBARA CROFT PH.D.  
301 496-9531  
erastage@mail.nih.gov

Application Number: 1 UH2 CA134194-01

Principal Investigator

LIU, PETER MD

Applicant Organization: UNIVERSITY OF CALIFORNIA SAN DIEGO

Review Group: GCMB  
Gastrointestinal Cell and Molecular Biology Study Section

Meeting Date: 03/24/2008  
Council: MAY 2008  
Requested Start: 07/01/2008

RFA/PA: PA01-295  
PCC: 2A

Project Title: UH2UH3-AT-PA01-295-SS-40308-FEE-1

SRG Action: Impact/Priority Score: 20 Percentile: 4  
Human Subjects: 10-No human subjects involved  
Animal Subjects: 10-No live vertebrate animals involved for competing appl.

Project Year	Direct Costs Requested	Estimated Total Cost
1	250,000	291,200
2	250,000	291,200
3	250,000	291,200
4	250,000	291,200
5	250,000	291,200
<b>TOTAL</b>	<b>1,250,000</b>	<b>1,456,000</b>

ADMINISTRATIVE BUDGET NOTE: The budget shown is the requested budget and has not been adjusted to reflect any recommendations made by reviewers. If an award is planned, the costs will be calculated by Institute grants management staff based on the recommendations outlined below in the COMMITTEE BUDGET RECOMMENDATIONS section.

EARLY STAGE INVESTIGATOR

NEW INVESTIGATOR

Impact/Priority Score  
in 10-90 range  
(avg x 10)

Percentile

- Rank order based on scores from current + 2 previous study sections
- Normalizes scores between study sections
- Grants below ~20% currently have a high probability of funding.



# Critiques provide essential information for resubmission

## CRITIQUE 1:

Significance	1
Investigator	2
Innovation	2
Approach	2
Environment	1

Criterion Scores are *independent* of the Overall Impact Score

Overall Impact comments in paragraph format

### Overall Impact:

The work proposed in this grant application will have high potential impact in the clinically important area of safe blood transfusion. The investigators are highly qualified with complementary expertise. This will help ensure success of the work. There is also novel application of incident reporting methods now in use in other fields, which could lead to improved public confidence in the blood supply. The study will bring a rigorous, systematic approach to the current reporting process, which is empiric and lacking in evaluation. The weaknesses of the application include a lack of representation of non-academic transfusion medicine practitioners, which may make incident reporting less effective in non-academic hospital settings. There is not enough time allotted for aim one work, and aims two and three are somewhat dependent on the success of aim one.

Review criteria comments in bullet format

### 1. Significance

#### Strengths

- An effective incident reporting system
- Models developed for other error-critical fields have been effectively adapted in the development of an incident-reporting system for transfusion medicine.
- Identifies and incorporates limited and appropriate range of human error patterns—will be easily transferable to practice.
- Could be generally applicable to understanding influence of incentives-deincentives on behavior.

#### Weaknesses

- Lack of representation of non-academic transfusion medicine practitioners, which may make incident reporting less effective in non-academic hospital settings.
- Unclear how incident reporting system would be utilized to reduce human error.
- Unclear whether public perception or clinical need is target of model application.

### 2. Investigators

#### Strengths

A scenic view of a forest with vibrant autumn foliage reflected in a calm lake. The trees are in various shades of red, orange, and yellow, with some green still visible. The water is still, creating a clear reflection of the trees and the sky. The sky is a clear, light blue.

Proposal Writing for Vision Scientists:  
an American Perspective

Good Luck!

David Williams

William G. Allyn Professor of Medical Optics  
The Institute of Optics, University of Rochester  
Special thanks to Cindy Gary (U Rochester)  
and Tom Greenwell (NEI)

**Grant Writing for Vision Scientists:  
an European approach**

**Pablo Artal**  
LABORATORIO DE OPTICA, UNIVERSIDAD DE MURCIA  
Murcia, SPAIN



**16-um**  
1994-2019 25 years of exploration

[pablo@um.es](mailto:pablo@um.es)  
[@pablo\\_artal](https://twitter.com/pablo_artal)

1



Murcia 



2



**16-um**  
1994-2019 25 years of exploration

**VOPTICA**  
SMART VISUAL OPTICS

3




*This seminar is a great idea from OPTICA/OSA!*

*Grant application is a critical part of a scientist's career and often learned the hard way... **by multiple rejections!***

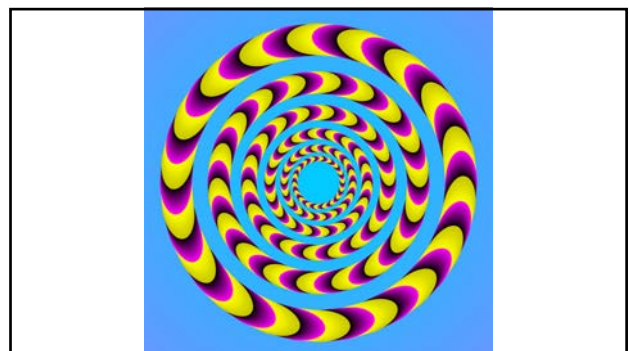
*There are many differences from countries, but there is something in common: scientific independence is related to be successful with grants!*

4



*I will focus in a particular grant from the European Research Council (ERC) that is especially relevant, but most comments/suggestions would be still valid for other funding agencies.*

5



6

<https://erc.europa.eu>



The European Research Council (ERC) – the first pan-European funding body for frontier research - was set up in 2007 under the EU's Seventh Framework Programme for Research (FP7, 2007-2013).

It aims to enhance the dynamic character, creativity and excellence of European research at the frontiers of knowledge.

Through peer reviewed competitions the best researchers are funded to perform their research in Europe.

7

<https://erc.europa.eu>



The ERC represents 17% of the overall Horizon Europe budget, i.e € 16 billion (2021-2027)

In 2021 €1.9 billion will be made available to allow some 1,000 top researchers to pursue frontier research

Since 2007, more than 12,000 projects and over 10,000 researchers have been selected for funding

ERC grantees have won prestigious prizes, including 9 Nobel Prizes, 4 Fields Medals, 9 Wolf Prizes and more

8

**erc** European Research Council  
Supporting top researchers from anywhere in the world

## STARTING GRANTS

**Who can apply?**  
Researchers of any nationality with **2-7 years of experience since completion of PhD** (Extensions are possible under certain circumstances — see the latest ERC Work Programme), a scientific track record showing great promise and an excellent research proposal

**What proposals are eligible?**

- Criteria  
Applications can be made in **any field of research**  
The ERC's grants operate on a 'bottom-up' basis without predetermined priorities.
- Location  
Research must be conducted in a **public or private research organisation** (known as a Host Institution/HI). It could be the HI where the applicant already works, or any other HI located in one of the **EU Member States or Associated Countries**

9

**erc** European Research Council  
Supporting top researchers from anywhere in the world

## STARTING GRANTS

- Host Institution**  
Applications for an ERC grant must be submitted by a single Principal Investigator (PI) in conjunction with and on behalf of their Host Institution, called the applicant legal entity.  
Grants are awarded to the Host Institution with the explicit commitment that this institution offers appropriate conditions for the Principal Investigator independently to direct the research and manage its funding for the duration of the project.  
Any type of legal entity, including universities, research centres and undertakings can host the PI and his/her team. Legally the host institution must be based in one of the EU Member States, or one of the associated countries.
- Team**  
ERC grants support projects carried out by an **individual researcher** who can employ researchers of any nationality as team members. It is also possible to have one or more team members located in a non-European country.

10

**erc** European Research Council  
Supporting top researchers from anywhere in the world

## STARTING GRANTS

**How much?**  
Starting Grants may be awarded up to € 1.5 million for a period of **5 years**. (pro rata for projects of shorter duration). However, an additional € 1 million can be made available to cover eligible "start-up" costs for researchers moving from a third country to the EU or an associated country and/or the purchase of major equipment and/or access to large facilities and/or other major experimental and field work costs.  
An ERC grant can cover up to 100% of the total eligible direct costs of the research plus a contribution of 25% of the total eligible costs towards indirect costs.

11

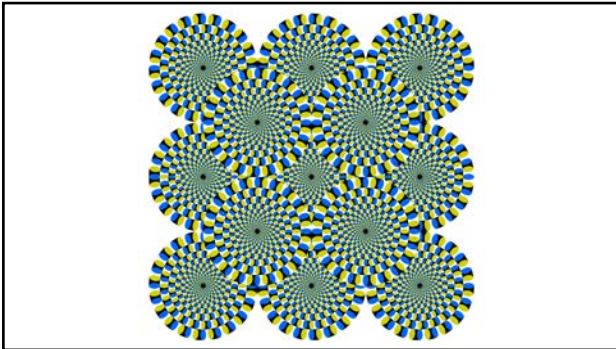
**OPTICA** ERC Starting Grant

**Grant Writing for Vision Scientists**  
29 January 2022 | 9:00 - 12:00 GMT (UTC+01:00)

*European Research Council (ERC) starting grants are a fantastic option for young researchers with great ideas!*

*However, it is very competitive (<10% success rate)*

12




13


 European Research Council  
Established by the European Commission  
**Supporting top researchers  
 from anywhere in the world**

*To apply or not to apply?*


14

*To apply or not to apply?*



who does not get wet does not  
cross the sea...


*Yes!*



15

*Who?*

*It is your PERSONAL application!*



16

*Who?*

*Is my CV adequate?*

17

*What/how to do?*

*The theme of the Project  
("bottom-up")*

*The panel: **Avoid the OBVIOUS***

18

### What panel?

(A practical example: Visual Optics)

**PE2 Fundamental Constituents of Matter**  
Particle, nuclear, plasma, atomic, molecular, gas, and optical physics

PE2\_1 Theory of fundamental interactions  
 PE2\_2 Phenomenology of fundamental interactions  
 PE2\_3 Experimental particle physics with accelerators  
 PE2\_4 Experimental particle physics without accelerators  
 PE2\_5 Classical and quantum physics of gravitational interactions  
 PE2\_6 Nuclear, hadron and heavy ion physics  
 PE2\_7 Nuclear and particle astrophysics  
 PE2\_8 Gas and plasma physics  
 PE2\_9 Electromagnetism  
 PE2\_10 Atomic, molecular physics  
 PE2\_11 Ultra-cold atoms and molecules  
 PE2\_12 Optics, non-linear optics and nano-optics

19

### What panel?

(A practical example: Visual Optics)

**PE7 Systems and Communication Engineering**  
Electrical, electronic, communication, optical and systems engineering

PE7\_1 Control engineering  
 PE7\_2 Electrical engineering: power components and/or systems  
 PE7\_3 Simulation engineering and modelling  
 PE7\_4 (Micro- and nano-) systems engineering  
 PE7\_5 (Micro- and nano-) electronic, optoelectronic and photonic components  
 PE7\_6 Communication systems, wireless technology, high-frequency technology  
 PE7\_7 Signal processing

20

### What panel?

(A practical example: Visual Optics)

**LS7 Prevention, Diagnosis and Treatment of Human Diseases**  
Medical technologies and tools for prevention, diagnosis and treatment of human diseases, therapeutic approaches and interventions, pharmacology, preventative medicine, epidemiology and public health, digital medicine

LS7\_1 Medical imaging for prevention, diagnosis and monitoring of diseases  
 LS7\_2 Medical technologies and tools (including genetic tools and biomarkers) for prevention, diagnosis, monitoring and treatment of diseases  
 LS7\_3 Nanomedicine  
 LS7\_4 Regenerative medicine  
 LS7\_5 Applied gene, cell and immune therapies  
 LS7\_6 Other medical therapeutic interventions, including transplantation  
 LS7\_7 Pharmacology and toxicology  
 LS7\_8 Effectiveness of interventions, including resistance to therapies  
 LS7\_9 Public health and epidemiology  
 LS7\_10 Preventative and prognostic medicine  
 LS7\_11 Environmental health, occupational medicine  
 LS7\_12 Health care, including care for the ageing population  
 LS7\_13 Palliative medicine

21

### Other panels relevant for Vision Research...

**PE6: Computer Science and Informatics**  
Informatics and information systems, computer science, scientific computing, intelligent systems

**LS5: Neuroscience and Disorders of the Nervous System**  
Nervous system development, homeostasis and ageing, nervous system function and dysfunction, systems neuroscience and modelling, biological basis of cognitive processes and of behaviour, neurological and mental disorders

**SH4: The Human Mind and Its Complexity**  
Cognitive science, psychology, linguistics, theoretical philosophy

22

### What panel?

- Look at lists of successful projects from past calls (searching for similar colleagues/topics)...
- Look at the panel members (remember that what you know is not always the best for you...)

23

### The topic

- Adapt it to the chosen PANEL
- It must be "reasonably" risky and ambitious, but "plausible"
- It cannot be something merely "continuous" and/or "incremental"

24

## The topic

*It must be a complete story (like a fairy tale)... with a (possibly) happy ending*



25

## The topic

*Something that you would really like to do (and others) and that you think if you had the project you would be able to do!*

*(it is important to convey "passion")*

26

## The proposal

- Prepare a professional ("perfect") report
- Includes a **proof of concept**
- Do not "forget" any relevant "paper"...
- Keep the proposal in **Focus** (don't try to cover everything)...
- Ask for help to mentors for revisions

27

## The proposal

*The evaluation process is in TWO steps, but you need to prepare two versions of the proposal (B1 & B2) at the time of presentation*

28

## The proposal

### What not to forget?

*B1: "extended synopsis" (5 pages)*

- State of the art: challenges & opportunities
- Project's main objectives
- Proof of concept
- Summary of the research plan
- Risks and benefits
- CV

29

## The proposal

### What not to forget?

*B2: Research project (15 pages)*

- State of the art
- Objectives
- Methods
- Resources (team and equipment)
- Budget (adjust to 1.5 M€)

30

***Interview!  
(in phase 2)***

31

*Prepare a balanced proposal...*



*and good luck!*



32



*Thank you for  
your attention,  
Pablo Arbol*

33