

Safeguarding the intangible heritage of French optics

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The fortieth anniversary of the SFO is an ideal occasion to launch PÉPITES [1], a national program to safeguard the scientific memory of French optics. By understanding the intergenerational links that have created today’s vibrant photonics sector, we can ensure that its future will be as radiant as in the past.

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The importance of intangible heritage

In 2003, UNESCO adopted the Convention for the Safeguarding of Cultural Intangible Heritage [2], filling an important gap in their broader 1972 World Heritage Convention. It is now generally accepted that all heritage is “a compendium of tangible and intangible” and indeed, as stated in a recent article in a journal published by the International Council of Museums, preserving intangible heritage is important to strengthen inclusiveness, representation and community involvement in a sustainable way [3].

Of course, it takes time to recognize what constitutes “heritage,” and this is as true in science and technology as it is in fields such as culture and architecture. On the human level, however, we know that the emergence of scientific or technological discovery is a complex process resulting from the sharing of ideas, chance encounters, not to mention friendships and controversies. In other words, scientific heritage is transmitted not only by written and spoken words, but also through conversations and arguments, as well as through general prevailing ideas and attitudes [4]. In practice, this means that simply

preserving physical instrumentation or documents does not capture the many factors that actually combine to generate discovery. And especially when the human stories are lost, this hinders the development of a complete picture of the scientific process.

Safeguarding scientific heritage

There are of course many examples where the material heritage of science is successfully safeguarded, most notably by museums, universities, research institutes, and associations. Yet within optics, such conservation is far from widespread, and it is often only by chance that important instrumentation or documents is saved from destruction. In France, the SFO clearly has a key role to play in raising awareness of the importance of our shared history, and to encourage national and local initiatives.

But what about our intangible scientific heritage? If efforts to safeguard instruments and other material still leave a lot to be desired, efforts to save the intangible heritage of French optics are almost non-existent. And even when they do exist, even though commendable and important, efforts are often isolated and unstructured, and without a long-term plan for preservation.

1 Catalogue	2 Collect	3 Safeguard	4 Disseminate
Choice of the subject that makes heritage	Interview of actors	Transcription	Help build community
Criteria - Scientific, tech evolution - Institutional - Celebration	Source crossing	Formatting	Through historians of science
Identifying actors and viewpoints	Contextualization of testimonials	Permanent preservation	Museums, public
→ Problematization → Good practices → Collab. historians	→ Informed agreement canvas → Interview protocol → Help with the implementation (shooting, sound)	→ Centralized permanent storage, compatible with local storage → Accessibility → Archives legal status	→ SFO Website → Flyers → Workshops → Exhibitions → Video editing,

Figure 1. Summary of the main four phases of the program. In the boxes in violet some of the possible contributions of the national program to the local initiatives are highlighted.

The AIP example

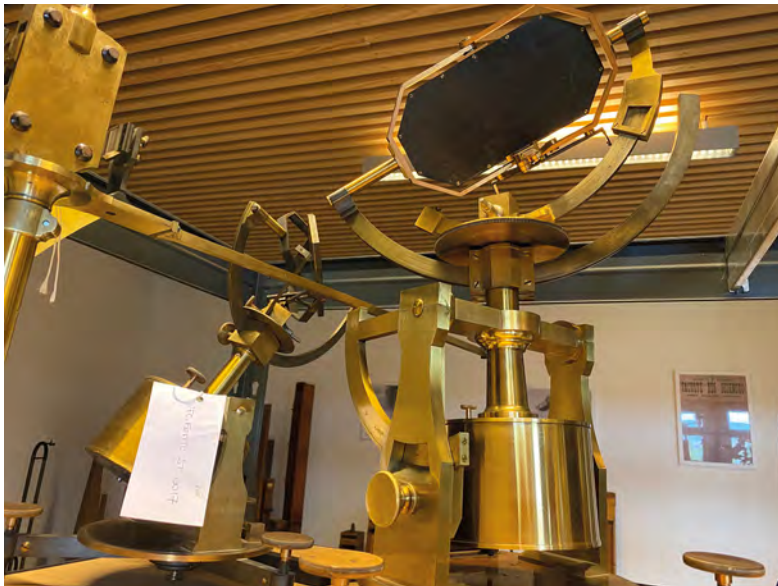
Internationally, there are some examples of successful initiatives focused on the intangible heritage of science. One, which in fact serves as inspiration for this project, is that of AIP (American Institute of Physics). Their Oral History

Interviews programme was initially launched in 1960, but it has continued to the present day, and now has 1,500 transcriptions of interviews with major physicists, all available online [5]. The wealth of information in these interviews is colossal!

The AIP project was the brainchild of the celebrated historian and philosopher Thomas Kuhn, and is widely considered to be the origin of the “science in action” perspective. It was initially focussed on recording memories of the early days of quantum physics, which even in the 1960s was a race against time given the age of the scientists involved. But after its initial success, the program has evolved considerably over time and has expanded to many other areas of physics.

The AIP interviews follow a structured protocol, and are designed and conducted in collaboration between physicists and historians of science. They explore a wide range of topics: the scientific contributions of the interviewees, their family environment, the origins of their scientific careers, and stories of collaboration between interviewees and their contemporaries [6]. One particularly rich example is Kuhn’s 1962 interviews of Léon Brillouin. These include discussions about the French educational system of the time, Brillouin’s family, the pro and anti-quantum sentiments of the time, working methods, as well as insights into the general process of scientific discovery. However, of the 1500 interviews in the AIP archives, only 9 are of French scientists: Léon Brillouin, Pierre Aigrain, Gérard De Vaucouleurs, Jules Guéron, Hélène Langevin-Joliot, Xavier Le Pichon, Francis Perrin, Bernard Sadoulet and Jean Ullmo. This is understandable given the particular focus of the AIP project, but at the same time it underlines the fact that if French scientific heritage is to be preserved more widely, the effort must come from within France.

BOX 1: OPTICS HERITAGE IN FRANCHE-COMTÉ



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The PEPITES project at the University of Franche-Comté (UFC) kicked off during 2023, celebrating both the 60th anniversary of a dedicated optics laboratory (now part of the Institut FEMTO-ST UMR 6174), and the 600th anniversary of the university itself. In collaboration between the university’s science, art and culture outreach service, the initiative aimed to preserve the rich heritage of optics in the region by interviewing and recording the memories of retired members of the laboratory. We found that a very effective method was to work with science communication graduate students, and to speak in very general terms in an informal setting. This proved very effective in uncovering insights and experiences, many of which had been forgotten and which were remembered only during the interviews. This project has not only celebrated important milestones but also bridging the gap between generations, shedding light on the progression and impact of optical research and education in the region.

The PEPITES project on intangible heritage at UFC has been accompanied by a parallel project on preserving physical heritage which now includes a museum of around 200 historical instruments (see photo), some dating to 1845. Inviting retired staff members to visit this collection allows us to complete our understanding of when the collection was established and when some of the equipment was last used in teaching or research.

Existing initiatives in France

Without claiming to be exhaustive, it is useful to mention a few similar programs that have been developed nationally in France. The Sciences: Histoire Orale (SHO) program in the



Figure 2. Some of the interviewees, from left to right. First row: Jean Bulabois, 1st SFO President; Françoise Chavel, 1st SFO General Secretary, Hervé Lefevre SFO President (2005-2007) and SFO Honorary member. Second row: Claude Fabre SFO President (2009-2011); Riad Haidar Editor Chef of Photonics (2014-2019); Pascale Nouchi, SFO President (2017-2019)

field of materials science (chemistry, physics, biology, instrumentation etc) has conducted around 30 interviews with researchers from academia and industry [7]. SHO, coordinated by the historian and philosopher of science Bernadette Bensaude-Vincent, is supported by the ESPCI and the Ile-de-France Region through the C'Nano IdF network. Interviews include: Jacques Friedel, Mildred Dresselhaus, Pierre-Gilles de Gennes, Jacques

Livage, Hervé Arribart, Jean-Pierre Boilot. There are also platforms dedicated to medical themes, including HISTRECMED, which has 115 interviews on aspects of 20th century medical research and public health [8].

These interviews are carried out by the science historian Jean-François Picard, who also runs the HISTCNRS programme [9]. which itself has compiled 85 interviews related to the history of the CNRS. And ●●●

of course, the historical archives of bodies such as the Collège de France and the Académie des sciences may well contain similar interview material, and it is encouraging to see other research organizations developing programs centred on their own histories. For example, the MANIP initiative of the Institut d'Optique

Graduate school has placed a series of thematic interviews online [10], and the Optics Department of the Institut FEMTO-ST has begun recording interviews with former staff members (see Box 1). And of course since 2020, Photoniques has played its part by regularly publishing interviews and testimonials [11].

PÉPITES – safeguarding the heritage of French optics

Although these existing efforts are important, there is clearly much more to be done. This is why SFO is launching the PÉPITES program that aims to both safeguard and disseminate the memory of the French optics community. Coordinated by a multidisciplinary committee (see Box 2), PÉPITES will focus on the entire ecosystem: academics, research scientists, engineering and technical staff, administrative staff and institutional leadership. The committee will ensure best practice, consistency in the information gathered, and will provide advice on procedures and tools in order to simplify local initiatives. The project will encompass both academia and industry, involve a series of annual and longer-term (five year) milestones, and key results will be summarised and prepared in a format suitable for the public. This will highlight both the rich heritage of French optics, as well as the many ways that the research in optics and photonics has benefitted society.

Methodology

Supporting the local dimension is central to the project's ambition and methodology. After all, it will be members of the local community who know best the particular episodes and individuals who have contributed to the development of optics in particular towns and regions. It is also important to stress that the process does not only involve physicists – safeguarding intangible heritage requires participation from the humanities (e.g. the French *Maison des Sciences de l'Homme et de la Société* structures), local museums, and libraries, and the wider community. PÉPITES is designed around an existing methodology developed by oral history expert Florence Descamps [12]. Schematically represented in Fig. 1, there are four key stages: Catalogue, Collect, Safeguard,

BOX 2: THE PÉPITES SCIENTIFIC COMMITTEE



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Science heritage conference at FEMTO-ST 2023. Photo © Vincent Boudon.

- David Aubin, Science historian, Institut de Mathématiques de Jussieu-Paris rive Gauche, Sorbonne Université/CNRS/Université Paris Cité
- Charlotte Bigg, Science historian, Centre Alexandre-Koyré, CNRS/EHESS
- Nicolas Bonod, Physicist, Institut Fresnel, CNRS/Aix Marseille Université/Centrale Marseille
- John Dudley, Physicist, FEMTO-ST, Université Franche Comté/CNRS
- Marie-Madeleine Greffet, Physicist, Professor secondary level
- Ariel Levenson, Physicist, Centre de Nanoscience et de Nanotechnologies, CNRS/Université Paris-Saclay
- Eric Picholle, Physicist, Institut de Physique de Nice, CNRS/Université Côte d'Azur
- Catherine Schwob, Physicist, Institut de Nanosciences de Paris, Sorbonne Université/CNRS

Advisor: Florence Descamps, Historian and economist

We warmly thank Alain Aspect, Nobel Prize Physics 2022, for his support and encouragement of this initiative.

and Disseminate, each associated with a number of more detailed elements as shown. Fig. 1 also presents the main typology of the contributions of PÉPITES to the local initiatives (bottom box in each column). Of course, how much can be achieved in practice will depend on available resources, but this structure provides a working template that can be readily adapted to particular local constraints.

Conclusion

Oral history is a key component of intangible heritage, providing a unique and personal window into the past that allows us to understand how scientific ideas develop and advance. It is essential that this is safeguarded for the generations to come. As Auguste Comte wrote - We do not fully understand a science until we know its history [13]. Oral memory through recent history, helps to anchor

scientific discovery and progress in this very same historical flow.

PÉPITES aims to safeguard the scientific memory of the French optics community, but to be effective it needs your involvement and commitment. We will be delighted to hear from anyone interested in implementing an oral history project within their own institutions, and to provide them with advice, information and practical assistance. Equally, we are certain that our plans will resonate within the broader international optics and photonics community, and we welcome collaboration with sister learned societies in Europe and worldwide. ●

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