EVALUATION OF INO

Brief executive summary

- Evaluation of the Institute, including an appraisal of its self-assessment (SWOT analysis)
The Institute is a strong performer in many aspects of Optics, with a particular strength in Cold Atoms and pockets of strength in more applied areas such as Sensors & Imaging. The Institute has been able to attract some strong junior researchers, so there is potential for further improvement and growth, especially as INO is also able to attract a large number of PhD students. The publication output is high, and the external research income is very good.

Regarding the SWOT Analysis, I broadly agree with the strengths. As to the weaknesses, I cannot comment on the internal factors of technical & admin staff. I agree with the commercialisation opportunities, mentioned both in “Opportunities” and in “Threats” that need to be explored further.

- Level of resources (funds and scientific equipment) in relation to the institute’s stated objectives
I cannot comment on internal resources, but I recognise that the external income is impressive. To quote from the INO website, which is more informative in many respects than the data provided by CNR, “During 2015, the National Institute of Optics (INO) will be involved in 69 projects with a total budget funded to the institute of 22,610,329.75 €”. This is a truly impressive figure for an Italian institute of this size.

- Evaluation of the unit’s major objectives in relation to CNR’s strategic directions
CNR’s strategic direction is not entirely clear, but it is clear that INO has a strategy of looking for synergies across its spectrum of activities and maximising its use of resources and available expertise.

- Overall judgement of the institute
Overall, we note the performance has a number of elements in the “world class” category and I would judge the institute “excellent” (2) overall.

2 Scientific/scholarly production
The Institute has published a large number of papers, i.e. almost 200, which I consider a very good performance. Of the 6 groups, “Cold Matter & Quantum Optics” stands out as producing by far the highest number of high quality papers (8 public. in journ. with IF>20), as well as having attracted 2 ERC projects. This group is easily the best cold atoms group in Italy and very competitive in Europe and the world. Of the other groups, “Sensors & Imaging” stands out as having attracted the most external funding.

It is difficult to compare the 6 groups between them, as it is not obvious how many of the 114 researchers are in each group; I am guessing that the cold atoms group is the largest. The “top 20” papers are clearly of high quality, although I note that a significant fraction of papers are not led by INO, but by associate partners. I also note recent highlights such as “Schrödinger’s cat reproduced in the laboratory” being among the ten biggest hits of Italian science in 2014, and published in Nature Photonics 2015.

The h-index table, in contrast, looks disappointing. Why are there only 25% of all researchers? Where are the others? This issue needs to be addressed in order to achieve a fair comparison across all Institutes of CNR. Also, while it is not surprising to have many people with h-indices around 20, I am missing more high performers; having only a single researcher with h>30 is disappointing. This is most likely de Natale (h=33 according to google scholar).

Invited talks are not part of the report, but would provide a good indicator for international visibility.

Overall points for this item: 62
3 Transfer of research results to society
I commend the Outreach activities, such as the contribution to the European Researcher’s Night and a number of other events around Italy. Similarly, the Institute’s increasing visibility in the news, e.g. coverage of “holographic telepresence” (May 2014) and other 8 TV news reports is good; In terms of patents, the Institute did very well in 2013 and less well in 2014, but I am less concerned about the number of patents as such rather than how they were used. In this respect, the translation of research appears to be improving, which is good to see; there are some very nice examples of technology transfer.

Taggalo SRL is mentioned as a spin-out company, but I cannot find a proper website, only a mention on social media. As to technical consultancy, I consider the quoted income of 150K€/yr and more than 30 technical reports/yr a good performance.

Overall points for this item: 10

4 Formation of highly qualified personnel
I note an impressive number of PhD students (132) which is highly commendable. Only a tiny fraction of these are non-Italian, however, which looks less impressive, although I see this as a problem with the Italian system as such rather than with INO.

The successful application for a total of 4 ERC Starter/Consolidator grants as well as 9 FIRB grants is also impressive and it reflects the fact that there are a number of promising young researchers, such as Marco Bellini, Matteo Zaccanti (ERC 2014), Marco Fattori (ERC 2011), Giacomo Roati (ERC 2012), some of whom have international experience. This clearly points towards a bright future for the Institute. Overall, the influx of good young people, many of whom have outside experience, is very promising.

Overall points for this item: 7

5 Quality of management and environment within the institute
The INO has organised a number of conferences, approx 2/year, all of which are in specialised areas. This is good. The chairmanship of the more general EQEC in Munich by former INO researcher Mario Agio is also noteworthy. In addition, I understand that the different research strands interact well and that there is a general annual meeting where the research strategy is being discussed. The Director appears to exercise strong and constructive leadership within the constraints imposed upon him by the central administration.

Overall points for this item: 6

6 Recommendations
1. INO needs to further identify what its strengths are and then build on these, while refocussing some of its other activities. For example, “Cold Matter & Quantum Optics” appears as a research strength, while “Nano&Biophotonics” appears less strong, especially as Diederick Wiersma has now moved to the university sector. Would it be better to focus on fewer activities (e.g. to reduce its research areas from currently 6 to 4-5), but increase the impact in these more focussed areas?

2. The international brand visibility needs to be stronger. For example, before conducting this report, I had not heard about INO, while I had heard about LENS and ICFO in Spain. INO has the potential to aspire to a similar reputation as ICFO. One possibility for achieving this is to recruit more aggressively abroad, especially for PhD students, another is to run more international events.
3. I commend INO for pursuing commercial opportunities and suggest that this area should be further strengthened. For example, “Sensors & Imaging” seems to have good potential for further commercial exploitation.

Regarding the report format, we would prefer to see the h-factor graph to include all researchers, and to see invited talks being mentioned as a metric.

Overall, I am happy to use the word “excellent” in the final assessment, although the performance across the breadth of activity could be more consistent.

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3 INO