

Title: Photonics in Radio Astronomy

RATIONALE

"Photonics is the generation, process and manipulation of photon to achieve a certain function. With photonics we manipulate the power (loss/gain), phase, polarization and wavelength independently. For radio astronomy, it presents the advantage of low electromagnetic interference, ultra high bandwidth , without the mechanical cumbersome parts typical of radio astronomy receivers. Fiber can be used to transport radio signal (RF) allowing the complex receiver circuitry to be hosted at distant locations, with low noise figure and high dynamic range. Where does the antenna and fronted ends and the backend begins ? Can we combine and beam form the response of several antennas or phase arrays ? Is it better to digitize at the frontend or at the backend ? The applications in real world are already innumerable, ranging from wireless networks to GPS. Fiber is also very efficient to transport data, with potentially dozens of THz available for transmission. Optical networks will be critical to performance of today's and future radio telescope networks, as is already demonstrated by e-EVN, e-Merlin, ALMA, the soon starting LOFAR and e-VLA and it will be even more so for the large Terabits/sec expected from the future facilities like the SKA. Photonics in the heart of radio astronomy receivers and networks is a natural path for development for the next advanced generation of radio astronomy experiments, with capabilities for industrial partnership."

We intend to review current trends in photonics and its use in radio astronomy applications, in receivers and signal transport. Some examples of real cutting-edge real-world examples will be provided by some industries.

Hotel- name, link, rooms reservation

Hotels:

The following hotels are in the city centre, at a walking distance from the conference place.

Participants are requested to contact the hotels directly.

Note: we will ask some of these hotel for special rates for the participants RadioNet Forum.

★★★★ Hotel Molicheiro

[Homepage](#) | [E-mail](#)

Single 85€ | Double 95€ | Breakfast included

Rua Barbosa de Magalhães, n.15/17, 3800-154 Aveiro

Tel: (+351) 234 377 400 | Fax: (+351) 234 377 401

Walking distance from Conference Site: 1.800 m

★★★ Best Western Hotel Imperial

[Homepage](#) | [E-mail](#)

Single 47.50€ | Double 60€ | Suite 70€ | Breakfast included

Rua Dr. Nascimento Leitão, 3810-108 Aveiro

Tel: (+351) 234 380 150 | Fax: (+351) 234 380 151

Walking distance from Conference Site: 1.300 m

★★★ Hotel Arcada

[Homepage](#) | [E-mail](#)

Single Standard 59€ | Double Standard 79€ |

Single Superior 69€ | Double Superior 89€

Hotel message: Hotel makes 10% discount over prices for EUROPT.

Rua de Viana do Castelo, n.º4 (Ponte Praça)

3800 – 275 Aveiro

Tel: (+351) 234 423 001 | Fax: (+351) 234 421 886

Walking distance from Conference Site: 1.700 m

★★★★ **Hotel Meliá Ria**

[Homepage](#) | [E-mail](#)

Single 77€ | Double 87€ | 3 PAX 35€ |

Suite Single 97€; Suite Double 106€

Breakfast included

Cais da fonte Nova, Lote 5, 3810-200 Aveiro

Tel. (+351) 234 401 000 | Fax (+351) 234 401 009

Walking distance from Conference Site: 1.800 m

★★★★ **Hotel As Américas**

[Homepage](#) | [E-mail](#)

Single 65€ | Double 77€ | Breakfast included

Rua Eng. Von Haff, n.20, 3800-176 Aveiro

Tel. (+351) 234 384 640 | Fax (+351) 234 384 258

Walking distance from Conference Site: 2.000 m

★★★ **Hotel Jardim Afonso V**

[Homepage](#) | [E-mail](#)

Single 43.35€ | Double 60.35€ | Breakfast included

Praceta D. Afonso, 3810-094 Aveiro

Tel: (+351) 234 426 514 | Fax: (+351) 234 424 133

Walking distance from Conference Site: 1.600 m

★★★ **Hotel Afonso V**

[Homepage](#) | [E-mail](#)

Double or Twin Executive 78€ | Twin Standard 72€ |

Single Executive 58€ | Single Standard 52,50€

Hotel message: 15% discount if you mention workshop at reservation.

Breakfast included

Rua Dr. Manuel das Neves, n.65, 3810-101 Aveiro

Tel: (+351) 234 425 191 | Fax: (+351) 234 381 111

Walking distance from Conference Site: 1.600 m

★★ **Hotel Aveiro Center**

[Homepage](#) | [E-mail](#)

Single with polibã 41€ | Single with bathtub 45€ | Single Superior 50€ |

Double with polibã 60€ | Double with bathtub 65€ | Double Superior 70€ |

Triple Room 75€

Breakfast included

Rua da Arrochela, n.º 6 – Albôis 3810 – 052 Aveiro

Tel: +351 234 380 390 | Fax: +351 234 380 391

Walking distance from Conference Site: 1.400 m

★★ **Hotel das Salinas**

[Homepage](#) | [E-mail](#)

Individual Room 41€ | Double Room 60€ | Triple Room 75€
Hotel das Salinas, Rua da Liberdade, nº10, 3810 – 126 Aveiro
Telf: +351 234 404 190 | Fax: +351 234 404 191
Walking distance from Conference Site: 1.400 m

Traditionally, Aveiro is known for its canals that flow through the city, for its characteristic boats, the Moliceiros, for its salt-pans and for its sweet delicacies.

Aveiro is an old city, albeit most of its center is Arts Nouveau located in the estuary of River Vouga. It is known by the long, colorful boats “moliceiros” of the Mediterranean type whose form dates back to Phoenicians and were until recently used to harvest algae as fertilizers to the fields. Its beaches are known for the very fine, white sand (it is the closest beach to Madrid!) and a rich variety of seafood.

Besides this postcard image, on arriving in Aveiro, any visitor will also take in the youth, vigour and dynamism that Aveiro exhibits. Despite its considerable growth in recent years, the city of Aveiro has been able to preserve its quality of life and offer access to the infra-structures and services of any modern urban center. Today, Aveiro is an industrial city, a hub for technology development, of commerce and services and also a centre for culture and leisure, with a burgeoning offer in various forms; cinema, theatre, art exhibitions, music, dance, the plastic arts, science, water sports, night-life ... you name it

10 things you really must do in Aveiro

- * Enjoy the beauty and the tranquillity of the canals and lagoon on foot, cycling or on board a beautiful Moliceiro boat;
- * Wander around the quaint streets of fishermen’s houses and friendly restaurants of the beira-mar old quarter of the city;
- * Discover the small treasures of Art Nouveau that dot the city;
- * Stroll around the university campus, a true open-air museum of modern Portuguese architecture;
- * At night, visit the area around the fish market, known as the Praça do Peixe, an essential meeting point for anyone who wants to enjoy a lively night in one of its many bars;
- * Indulge in the varied traditional food, from fish stews to the famous ovos moles (a sweet egg confection in a fine casing or served in other confections);
- * Take a ride to the neighbouring beaches of Barra, with its impressive lighthouse or to Costa Nova, with its colourful striped houses;
- * Walk between the white sand of the dunes and centuries-old pine trees and observe the waterfall in the Natural Reserve of the São Jacinto Dunes;
- * Climb the breathtaking mountains on the interior, like Caramulo, Buçaco and Freita, where wild nature intermingles with museums, palaces and distinctive villages;
- * Mingle with the local people in one of the traditional festivities that take place throughout the year.

Figures

- 75 000 people live in the county of Aveiro
- 1759 was the year Aveiro was made a city
- 45 km is the extent of the Aveiro lagoon
- 2h15 is the time that it takes to get from Aveiro to Lisbon by train
- 50 minutes separate Aveiro from the city of Porto by car
- 8 km is the distance of the nearest beach from the city centre
- A25 is the new highway that connects Aveiro to the Spanish border, 178 km away

How to reach Aveiro

By road:

From the north using the A1 motorway or from the east using the A25:

Take the A1 motorway in the direction of Lisbon. Exit the A1 in the direction of Aveiro and take the A25. From the A25 there are two exits to the city, first "Aveiro-Norte" and then some kilometers later there is "Aveiro".

From the south using the A1 motorway:

Take the A1 motorway in the direction of Porto. Exit the motorway at "Aveiro-Sul/Águeda" (exit 15) and follow the EN235 road directly to city centre.

By air:

The closest airport is Francisco Sá Carneiro international airport in Porto, located some 80 km to the north of Aveiro. Portela international airport in Lisbon is located 250 km to the south of Aveiro.

By train from Porto Airport

The train is the most practical means of making the journey to Aveiro. The trip between the airport and the railway station (called Porto-Campanhã), which has direct rail connections to Aveiro, can be made by taxi for around 25€ and takes around 30 minutes. A less expensive alternative to reach the train station is to use Metro. At the airport you have a metro line called "E line" or "purple line" that you can use to get to the railway station (metro stop: Campanhã) ([see map](#)). Metro trains depart from airport every 20 minutes. More information on subway prices and timetables are available at www.metroporto.pt. The train journey from Porto-Campanhã to Aveiro takes between 40 minutes and 1h15 (and a single ticket may cost between 2.5€ and 15€), depending on the type of train used. The train journey from Porto-Campanhã to Aveiro using the "Alfa" and "Intercidades" trains takes around 40 minutes and costs between 9€ and 13€. There are (at least) one train every hour from 6.00AM to 8.30PM.

The train journey can also be made using the suburban trains and takes around 70 minutes and costs 2.15€. There are (at least) one train every hour from 5.00AM to 1.00AM (next day).

More information on train prices and timetables are available at the Portuguese railroad company CP www.cp.pt.

Aveiro railway station is located in the centre of the city about 15 minutes walking distance or 5-minute taxi ride from the conference venue.

By car from Porto Airport

At the airport there are various car hire agencies. Follow the signs for the A1 motorway in the direction of Lisbon (there is a toll charge of around 3.5€, and can be paid in cash or with a credit/debit card). Leave the A1 at the exit for Aveiro and take the A25.

By train from Lisbon airport

The simplest way of transportation to Aveiro is by train. From the airport to Lisboa-Oriente railway station, the taxi ride takes about 10 minutes and costs around 10€. Alternatively there are buses (lines 5 and 44). The ticket can be bought on the bus for around 1€. Given the distance between Lisbon and Aveiro, it is best to use the fast train services (Alfa or Intercidades). The journey will take around 2h30 and a single ticket costs up to about 25€. There are (at least) one train every hour from 6.00AM to 9.30PM. Information on train prices and timetables are available at www.cp.pt.

By car from Lisbon Airport

There are various car-hire agencies at the airport. From the airport, follow the signs for the A1 motorway in the direction of Porto. Leave the motorway at "Aveiro-Sul/Águeda" (exit 15) and take the EN235 directly to the city centre. The toll charge for use of the motorway is around 15€ and can be paid in cash or with a debit card.

By bus from Lisbon Airport

The bus station, called Terminal Rodoviário do Arco do Cego, is on Av. Duque D'Ávila, 12. Timetables and prices can be consulted at www.rede-expressos.pt.