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# Curriculum vitæ

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**CARLES BATLLE ARNAU**

**Departament de Matemàtiques  
Universitat Politècnica de Catalunya**

Vilanova i la Geltrú, 2 d'octubre de 2025

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# 1 Short summary in English

Carles Batlle-Arnau graduated in physics in 1984 from the Universitat de Barcelona, where he also obtained his PhD in theoretical physics in 1988, with a thesis on certain aspects of string field theory, under the direction of professor Joaquim Gomis. After a year as a post-doctoral researcher at the Department of Physics of the University of Princeton, he joined the Universitat Politècnica de Catalunya-BarcelonaTech (UPC), where he became an associate professor in applied mathematics in 1993.

His research interests comprise several fields of both theoretical physics and systems and control theory. In theoretical physics he has studied the symmetries of relativistic and non-relativistic systems, with 20+ papers in JCR journals (1986-1990 and 2014-present). In systems and control theory he has been interested mainly in control of chaos in power converters and modelling and control of electromechanical and energy conversion and storage systems. In this area he has published  $\sim 20$  JCR papers (1996-present), as well as 40+ contributed communications to international conferences. He also served as associate editor for Control Engineering Practice (2008-2016).

He has been the main researcher of two Spanish ministry CICYT projects (2007-2008 and 2009-2012) and participated as a researcher in another 20+ (CICYT, European or other). He was also the leader of a research project with Lear Corporation (2007-2008).

He has an h-parameter of 12, with number of citations ranging from 80 to 12 (excluding self-citations of any co-author). He has obtained 5 positive 6-year research evaluations from the *Comisión Nacional Evaluadora de la Actividad Investigadora*.

He has also served as vice-dean of the *Escola Politècnica Superior d'Enginyeria de Vilanova i la Geltrú* (EPSEVG) for several stints.

His main scientific interests are

- The study of systems described by singular Lagrangians (those which yield a non-invertible Legendre transformation), and the gauge symmetries associated to them, including classical mechanics and field theories and string field theory.(1986-1992)
- The study of chaos and the stabilization of unstable periodic orbits in power converters. (1996-2005)
- The application of passivity-based control in power converters and electromechanical systems described by port-Hamiltonian systems. (2003-2010)
- The modelling and control of hydrogen fuel cell, vanadium redox flow, hydrogen storage systems and electrolizers. (2010-)
- The application of model reduction techniques (2008-2019) and physics informed neural networks (2024-) to several systems of interest in engineering, as well as some theoretical developments in these areas.
- The study of space-time symmetries of relativistic and non-relativistic systems.(2014-)

He has taught a variety of subjects to students of engineering and mathematics degrees, mostly at the EPSEVG, but also at the *Facultat de Matemàtiques i Estadística*, the *Escola Tècnica Superior d'Enginyeria de Telecomunicacions de Barcelona* and the *Facultat d'Informàtica de Barcelona*, all of them UPC centers, and, for brief period, at the *Escola Superior de Comerç Internacional* of the Universitat Pompeu Fabra. He has advised or co-advised 8 doctoral thesis in the Applied Mathematics, the Electronic Engineering and the Automatics, Robotics and Vision doctoral programs of the UPC. He has published several undergraduate level books in applied mathematics, as well as chapters in 3 books devoted to nonlinear phenomena in power electronics, port-based modeling and optimal control, respectively.

## 2 Dades personals

**Cognoms:** Batlle Arnau

**Nom:** Carles

**Lloc i data de naixement:** Vilanova i la Geltrú, 29 d'abril de 1961

**Universitat:** Universitat Politècnica de Catalunya

**Departament:** Departament de Matemàtiques

**Centres d'assignació:** Escola Politècnica Superior d'Enginyeria de Vilanova i la Geltrú, Institut d'Organització i Control de Sistemes Industrials

**Categoria actual:** Professor Titular d'Universitat

**Àrea de coneixement:** Matemàtica Aplicada

**Adreça 1:** EPSEVG, Av. Víctor Balaguer s/n, 08800 Vilanova i la Geltrú, **Tel:** +34 93 896 77 13, **Fax:** +34 93 896 77 00.

**Adreça 2:** IOC, Av. Diagonal 647, planta 11 (Edifici ETSEIB), **Tel:** +34 93 401 66 59, **Fax:** +34 93 401 66 05

**Email:** carles.batlle@upc.edu, carbatar@gmail.com

**Web:** <https://mat-web.upc.edu/people/carles.batlle/>

**ORCID:** <http://orcid.org/0000-0002-6088-6187>

**ResearchID:** A-7800-2008

**Trams de docència reconeguts (*Quinquennis*):** 6 de bàsics i 6 d'addicionals.

**Trams de recerca reconeguts (*Sexennis*):** 5 de bàsics 1985-1990 (1999), 1996-2003 (2004), 2004-2009 (2010), 2010-2015 (2016), 2016-2021 (2022), i 5 d'addicionals (2003, 2004, 2010, 2016, 2022).

**Trams de gestió reconeguts:** 2 (2007, 2024).

## 3 Títols acadèmics

- Llicenciat en Física, especialitat de Física Fonamental, Universitat de Barcelona, juny de 1984.
- Grau de Llicenciatura en Física, Universitat de Barcelona, juny de 1985, amb la tesina “Teories clàssiques de camps descrites per Lagrangianes singulars”, dirigida pel Dr. Joaquim Gomis Torné.
- Doctor en Física, Universitat de Barcelona, juny de 1988, qualificació “apte cum laude” i Premi Extraordinari de Doctorat de la Facultat de Física, amb la defensa de la tesi “Teories de camps de cordes”, dirigida pel Dr. Joaquim Gomis Torné. [http://catalleg.ub.edu/record=b1074920~S5\\*cat](http://catalleg.ub.edu/record=b1074920~S5*cat)

## 4 Llocs docents ocupats

- Departament de Termologia, Facultat de Física, Universitat de Barcelona,
  - Professor encarregat de curs nivell C, 1-04-86 a 1-07-86.
- Departament de Matemàtica Aplicada IV, fins juliol 2000 Departament de Matemàtica Aplicada i Telemàtica, Universitat Politècnica de Catalunya,
  - Professor associat a temps complet, 1-11-89 a 1-05-91.
  - Titular d'Escola Universitària, 2-05-91 a 15-06-93.
  - Titular d'Universitat, 16-06-93 fins avui.

## 5 Activitat docent

### Assignatures d'enginyeries tècniques i diplomatures (1989-2008)

- EPSEVG (antiga EUPVG), UPC, enginyeries tècniques i diplomatures:
  - Càlcul Infinitesimal
  - Àlgebra
  - Matemàtiques de la Telecomunicació
  - Matemàtica Discreta
  - Àlgebra i equacions diferencials
  - Ampliació de matemàtiques i estadística
  - Anàlisi Matemàtica
  - Curs Introductor

### Assignatures de segon cicle (2004-2010)

- EPSEVG, UPC, Enginyeria en Automàtica i Electrònica Industrial:
  - Modelat i simulació de sistemes dinàmics

### Assignatures de llicenciatura

- Facultat de Física, UB, Llicenciatura de Ciències Físiques (1986):
  - Mecànica i ones
- Facultat de Matemàtiques i Estadística, UPC, Llicenciatura de Matemàtiques (1996-2003):
  - Geometria diferencial I
  - Anàlisi real
  - Geometria diferencial II
  - Càlcul II

### Assignatures de doctorat (2000-2006)

- Programa de Doctorat de Matemàtica Aplicada de la UPC (Programa amb *Mención de Calidad* de la Dirección General de Universidades, cursos 2003-2004 i 2004-2005).
  - Introducció a la geometria dels sistemes no lineals.
- Programa de Doctorat d'Automatització Avançada i Robòtica, IOC, UPC (Programa amb *Mención de Calidad* de la Dirección General de Universidades, curs 2004-2005 i 2005-2006).
  - Teoria de Control Realimentat.

### Assignatures de postgrau (2007-2012)

- Màster en Automàtica i Robòtica, UPC,  
<http://www.upc.edu/catala/estudis/masters-ees/general.php?id=88>.
  - Mètodes Matemàtics.
- Màster en Matemàtica Aplicada, UPC,  
<http://www.upc.edu/catala/estudis/masters-ees/general.php?id=120>.
  - Modelització i Control de Sistemes Dinàmics (2007-2010).

## Assignatures de grau (2009-)

- Graus d'Enginyeria Industrial (EPSEVG)
  - Fonaments Matemàtics.
  - Equacions Diferencials.
  - Estadística.
- Grau en Enginyeria Informàtica (EPSEVG)
  - Lògica i Àlgebra.
  - Estadística.
- Grau en Matemàtiques (FME)
  - Models Matemàtics de la Física (2012-2015 i 2021-).
  - Càlcul Diferencial (2016-2019).
  - Varietats Diferenciables (2022-2024)
- Grau en Enginyeria Física (ETSETB)
  - Mètodes Matemàtics II (2012-2023).
- Grau en Bioinformàtica (ESCI-UPF)
  - Àlgebra (2018-2019 i 2029-2020) (en anglès).
- Grau en Ciència i Enginyeria de Dades (FIB)
  - Àlgebra i Càlcul Avançats (2024-).

## Altres mèrits docents

- Reconeixement als **mèrits docents d'especial qualitat** obtinguts a l'avaluació del període 11/2004-10/2009, en el marc del procés d'avaluació del complement addicional docent de la convocatòria 2009.

## 6 Activitat de gestió

- EUPVG, Sotsdirector d'Afers Econòmics, 1997-1999.
- EUPVG, Sotsdirector de Relacions Internacionals, 2001-2003.
- EPSEVG, Sotsdirector d'Organització Docent i Recerca, 2003-2006.
- EPSEVG, Sotsdirector Cap d'Estudis i Planificació Acadèmica, 2020-2025.

## 7 Activitat de recerca

### Participació en grups de recerca

- Grup de Física Teòrica del Departament de Física Teòrica i posteriorment Departament d'Estructura i Constituents de la Matèria de la Universitat de Barcelona, de 1984 a 1993.
- Grup de Geometria Diferencial, Sistemes Dinàmics i Aplicacions del Departament de Matemàtica Aplicada IV de la UPC, de 1994 a 2002.
- Grup de Control Avançat de Sistemes d'Energia (ACES: Advanced Control of Energy Systems), a partir de 2002.

## Temes de recerca amb activitat recent

- Teoria de sistemes i de control.
- Modelatge i control de sistemes d'emmagatzematge d'energia.
- Simetries de sistemes clàssics i quàntics.

## Participació en projectes de recerca subvencionats

- “Temas de la teoría de las partículas y de los campos”  
Entitat finançadora i identificació: CAICYT, AE 85-0016-1, 86-0016-2, 87-0016-3, 88-0016-4. Període: de 1985 a 1988. Responsable: Rolf Tarrach Siegel (UB).
- “Lagrangianes singulars d'ordre superior”  
Entitat finançadora: Fundació Universitària Agustí Pedro i Pons (UB). Període: d'octubre de 1987 a setembre de 1988. Responsable: Carles Batlle Arnau (UB).
- “Teorías de campos de cuerdas”  
Entitat finançadora: MEC, Programa Sectorial de Becas de Formación del Profesorado y Personal Investigador en el Extranjero. Període: de setembre de 1988 a agost de 1989. Responsable: Carles Batlle Arnau (UB).
- “String field theory”  
Entitat finançadora i identificació: OTAN, International Cooperative Action ref. 0763/87. Període: de desembre de 1987 a desembre de 1990. Responsable: Joaquim Gomis Torné (UB) y Stuart Samuel (City College, CUNY).
- “Temas de la teoría de los campos y de las cuerdas”  
Entitat finançadora i identificació: CICYT, AEN 89-0347. Període: de 1989 a 1990. Responsable: Rolf Tarrach Siegel (UB).
- “Técnicas geométricas aplicadas al control no lineal de sistemas dinámicos”  
Entitat finançadora i identificació: TAP94-0552-C03-02. Responsable: Enric Fossas Colet (UPC). Període: 19-05-1994 a 19-05-1997. Import: 8.756.000.
- “Control no lineal de un bus energético”  
Entitat finançadora i identificació: TAP97-0969-C03-01. Responsable: Enric Fossas Colet (UPC). Període: 01-08-1997 a 31-07-2000. Import: 16.360.000.
- “Sistemas no holónomos y control”  
Entitat finançadora i identificació: CICYT, PB98-0920. Responsable: Miguel Carlos Muñoz Le-canda (UPC). Període: de 2000 a 2002. Import: 2.900.000.
- “Controladores digitales de estructura variable para convertidores reversibles back-to-back”  
Entitat finançadora i identificació: DPI2000-1509-C03-02. Responsable: Jordi Riera i Colomer (CSIC). Període: 28-12-2000 a 27-12-2003. Import: 10.000.000.
- “Geometrical Network Modeling and Control of Complex Physical Systems”, [www.geoplex.cc](http://www.geoplex.cc)  
Entitat finançadora i identificació: UE, IST-2001-34166. Responsable: Stefano Stramigioli (Univ. Twente). Responsable UPC: Enric Fossas Colet. Període: 2-03-2002 a 28-02-2006. Import UPC: 123.732 euro. Import total pel consorci: 3,50 milions euro.
- “Simulation and Control of Non Smooth Systems”, [maply-univ-lyon1.fr/siconos](http://maply-univ-lyon1.fr/siconos)  
Entitat finançadora i identificació: UE, IST-2001-37172. Responsable: Bernard Brogliato (INRIA, Grenoble). Responsable UPC: Gerard Olivar Tost. Període: 1-09-2002 a 31-08-2006. Import UPC: 212.954 euro. Import total pel consorci: 2,82 milions d'euro.

- “Modelado y Control de Sistemas de Conversión de Energía Eléctrica Hamiltonianos y de Estructura Variable ”,  
Entitat finançadora i identificació: Gobierno de España. Ministerio de Ciencia e Innovación DPI2002-03279. Responsable: Carles Batlle (UPC). Periode: 2002-12-01 a 2005-11-30. Import: 74.400 euro.
- “Diseño y control del sistema de acondicionamiento de energía eléctrica para pilas de combustible”,  
Entitat finançadora i identificació: DPI2004-06871-CO2-02. Responsable: Robert Griñó (UPC). Periode: 01-12-2004 a 30-11-2007. Import: 89.100 euro.
- Reconeixement i finançament del grup *Control Avançat de Sistemes d’Energia*,  
Entitat finançadora i identificació: DURSI (Generalitat de Catalunya) SGR2005 00743. Responsable: Enric Fossas (UPC). Periode: 2005 a 2008. Import: 52.600 euro.
- “Estructuras de Dirac: discretización y reducción de orden de modelos”,  
Entitat finançadora i identificació: Gobierno de España. Ministerio de Ciencia e Innovación MTM2007-62480. Responsable: Carles Batlle (UPC). Periode: 2007-12-01 a 2008-11-08. Import: 8.760 euro.
- “Algoritmos para la reducción de orden y control de sistemas interconectados de gran dimensión”,  
Entitat finançadora i identificació: Gobierno de España. Ministerio de Ciencia e Innovación DPI2008-01408. Responsable: Carles Batlle (UPC). Periode: 2009-01-01 a 2012-03-30. Import: 49.709 euro. 8 investigadors.
- Reconeixement i finançament del grup *Control Avançat de Sistemes d’Energia*,  
Entitat finançadora i identificació: Departament d’Innovació, Universitats i Empresa (Generalitat de Catalunya) 2009SGR00998. Responsable: Enric Fossas (UPC). Periode: 2009 a 2013. Import: 47.840 euro.
- “Propulsor híbrido para vehículo urbano ligero”, 402376/2009-09 CNPq (Brasil). Responsable: Néstor Roqueiro (UFSC). Periode: 06-05-2010 a 05-05-2012. Import: 270.835 RB.
- “Desarrollo de sistemas de control para la mejora de la eficiencia y vida útil en sistemas basados en pilas de combustible PEM” (MESPEM), DPI2011-25649 . Responsable: Maria Serra (UPC-IRI). Periode: 01-01-2012 a 31-12-2014. Import: 108.000 euro.
- “Physical bottom up multiscale modelling for automotive PEMFC innovative performance and durability optimization” (PUMAMIND),  
Commission of European Communities, FP7-303419. Responsable UPC: Maria Serra (UPC-IRI). Periode: 17-12-2012 a 16-12-2015. Import UPC: 187.047 euro.
- Reconeixement i finançament del grup *Control Avançat de Sistemes d’Energia*,  
Entitat finançadora i identificació: Departament d’Innovació, Universitats i Empresa (Generalitat de Catalunya) 2014 SGR 267. Responsable: Josep M. Olm (UPC). Periode: 2014-01-01 a 2017-04-30. Import: 30.000 euro. 21 investigadors
- “Estimación, diagnosis y control para la mejora de la eficiencia y la vida útil de las pilas de combustible tipo PEM” (MICAPEM-IRI), DPI2015-69286-C3-2-R. Responsable(s): Maria Serra (UPC-IRI) i Ramon Costa (UPC) Periode: 2016 a 2019. Import: 142.000 euro.
- “Innovative cost improvements for balance of plant components of automotive PEMFC systems” (INN-BALANCE),  
Entitat finançadora i identificació: European Commission H2020-735969-INN-BALANCE. Responsable: Maria Serra (UPC). Periode: 2017-01-01 a 2021-10-31. Import: 258.517 euro. 4 investigadors.

- “Control Avançat de Sistemes d’Energia”,  
Entitat finançadora i identificació: Departament d’Innovació, Universitats i Empresa (Generalitat de Catalunya) 2017 SGR 872 . Responsable: Josep M. Olm (UPC). Període: 2017-01-01 a 2021-09-30. Import: 20.000 euro. 11 investigadors.
- “Control y gestión de energía en vehículos eléctricos híbridos con pilas de combustible”(DOVELAR-IRI), RTI2018-096001-B-C32. Responsable(s): Ramon Costa (UPC) i Maria Serra (UPC-IRI) Període: 2019 a 2022. Import: 121.000 euro. 10 investigadors.
- “Hydrogen lab for the modernisation and technological transformation of the city of Barcelona”,  
Entitat finançadora i identificació: Institut de Cultura de Barcelona, 19S001453-006. Responsable: Maria Serra (UPC-IRI). Període: 2019-12-27 a 2021-06-27. Import: 30.900 euro. 4 investigadors.
- “Advanced Control and Power Electronics Systems”,  
Entitat finançadora i identificació: Departament d’Innovació, Universitats i Empresa (Generalitat de Catalunya) 2021 SGR 00376. Responsable: Robert Griñó (UPC). Període: 2022-01-01 a 2025-06-30. Import: 40.000 euro. 15 investigadors.
- “Estimación y control en baterías de flujo redox de vanadio”(MAFALDA),  
Entitat finançadora i identificació: Agencia Estatal de Investigación, PID2021-126001OB-C31. Responsable: Ramón Costa i Maria Serra (UPC). Període: 2022-01-01 a 2025-12-31. Import: 150.887 euro. 12 investigadors.
- “Gestión eficiente de sistemas energéticos incluyendo almacenamiento de energía electroquímico híbrido mediante técnicas de digitalización”(MASHED),  
Entitat finançadora i identificació: Agencia Estatal de Investigación, TED2021-129927B-I00. Responsable: Ramón Costa i Vicenç Puig (UPC). Període: 2022-12-01 a 2025-09-30. Import: 247.480 euro. 18 investigadors.
- “Electrified single stage ammonia cracking to compressed hydrogen”(SINGLE),  
Entitat finançadora i identificació: European Commission, HORIZON-101112144-SINGLE. Responsable: Maria Serra (UPC). Període: 2023-05-01 a 2026-04-30. Import: 196.250. 6 investigadors.

## 7.1 Participació en contractes de I+D d’especial rellevància amb empreses i/o administracions

- “Desenvolupament del control amb DSP d’un prototipus del sistema motor d’un vehicle híbrid”, Lear Corporation, UPC-CTT C-06466, Carles Batlle (UPC), juny 2006 a desembre 2007, 78.750 euro.
- “Disseny, desenvolupament i control d’un convertidor estàtic reversible de conversió dc-dc d’alta potència i altes prestacions en l’àmbit de l’automoció”, Lear Corporation, UPC-CTT C-06900, Domingo Biel (UPC), setembre 2007 a setembre 2008, 63.000 euro.
- “Disseny, desenvolupament i control d’un convertidor estàtic amb funcionalitats d’inversor (conversió DC-AC) i rectificador (conversió AC-DC) en l’àmbit de l’automoció”, Lear Corporation, UPC-CTT C-06901, Ramon Costa (UPC), setembre 2007 a setembre 2008, 78.750 euro.

## 7.2 Beques i ajuts personals

- Becari de la Fundació Universitària *Agustí Pedro i Pons* de la Universitat de Barcelona, curs 1987-1988, amb import total de 500.000 pts., per desenvolupar un treball sobre “Lagrangians singulars d’ordre superior”.
- Becari del *Programa sectorial de becas de formación del profesorado y personal investigador en el extranjero* del Ministerio de Educación y Ciencia, de setembre de 1988 a agost de 1989, amb import mensual de 180.000 pts. més despeses derivades.

### 7.3 Estàncies en centres estrangers

1. CENTRE: Department of Physics, Princeton University.  
LLOC: Princeton (NJ).  
PAIS: Estados Unidos.  
ANY: 1988, 1989  
PERIODE: 1 any  
TEMA: Teories de camps de cordes.

## 8 Tesis dirigides

1. “Modelling and nonlinear control of voltage frequency of hydroelectric power plants”, tesi d’**Oscar D. Quiroga** presentada en el programa de doctorat *Automatització Avançada i Robòtica* del Institut d’Organització i Control de Sistemes Industrials de la UPC. Co-dirigida per Jordi Riera. Defensada el 27 d’octubre de 2000 amb la qualificació **excel·lent cum laude**.
2. “Modeling, simulation and control of a doubly-fed induction machine controlled by a back-to-back converter”, tesi d’**Arnau Dòria Cerezo** presentada en el programa de doctorat *Automatització Avançada i Robòtica* del Institut d’Organització i Control de Sistemes Industrials de la UPC (Programa amb Menció de Qualitat MCD2004-00336, BOE 11-8-2006). Defensada el 18 d’octubre de 2006 amb la qualificació **excel·lent cum laude**.
3. “Contribució a l’estudi dels exponents de Lyapunov per a sistemes bilineals i a l’anàlisi de les bifurcacions en el convertidor boost amb superfície de lliscament i histèresi”, tesi d’**Imma Massana** presentada en el programa de doctorat *Matemàtica Aplicada* de la UPC. Co-dirigida per Gerard Olivari. Defensada el 31 d’octubre de 2006 amb la qualificació **excel·lent**.
4. “Modeling and numerical study of nonsmooth dynamical systems”, tesi d’**Iván Merillas** presentada en el programa de doctorat *Matemàtica Aplicada* de la UPC. Co-dirigida per Gerard Olivari. Defensada el 22 de febrer de 2007 amb la qualificació **excel·lent cum laude**.
5. “Contribution to the model and navigation control of an autonomous underwater vehicle”, tesi d’**Julián González-Agudelo** presentada en el programa de doctorat *Enginyeria Electrònica* de la UPC (Programa amb Menció cap a l’Excel·lència, MEE2011-0690, Resolució 6-X-2011 de la SGU). Co-dirigida per Spartacus Gomàriz. Defensada el 31 de juliol de 2015 amb la qualificació **excel·lent cum laude**.
6. “Modelling and control of PEM fuel cells”, tesi d’**María Laura Sarmiento Carnevalli** presentada en el programa de doctorat *Automàtica, Robòtica i Visió* de la UPC (Menció d’excel·lència MEE2011-0453: 2011, 2012, 2013). Co-dirigida per Maria Serra. Defensada el 22 de setembre de 2017 amb la qualificació **excel·lent cum laude**.
7. “Canonical realizations of Bondi-Metzner-Sachs-like symmetries in field theory”, tesi de **Víctor M. Campello Román** presentada en el programa de doctorat *Matemàtica Aplicada* de la UPC. Co-dirigida amb Joaquim Gomis (UB - emèrit). Defensada el 8 de juliol de 2024 amb la qualificació **excel·lent**.

## 9 Publicacions: llibres o capítols de llibre

1. C. BATLLE, I. MASSANA, M. ZARAGOZÁ  
Àlgebra i equacions diferencials, Edicions UPC, Aula Politècnica 33 (2000). ISBN: 84-8301-405-X.
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- *Interconnection and control of hamiltonian systems*, seminari del Departament de Matemàtica Aplicada IV, UPC, maig 2002.
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- *Electromechanical systems: the PCHD formulation*, seminari del Departament de Matemàtica Aplicada IV, UPC, octubre 2002.
- *Applications of passive control to electromechanical systems*, EURON/GEOPLEX Summer School on Modelling and Control of Complex Dynamical Systems: from Ports to Robotics, Bertinoro, Italy, juliol 2003.
- *Introduction to bond graph theory. First part: basic concepts*, seminari intern ACES, IOC, UPC, abril 2005.
- *Introduction to bond graph theory. Second part: multiport field and junction structures, and thermodynamics*, seminari intern ACES, IOC, UPC, abril 2005.
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## 15 Altres mèrits acadèmics

- Premi Extraordinari de Doctorat de la Facultat de Física de la UB, curs 1987-1988.
- Editor Associat de *Control Engineering Practice* (de novembre 2008 fins a 2016).
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- Avaluador de l'AGAUR, de l'ANEP i de la NWO (Holanda).
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