

# Faculty Performance Documentation – 2011

Name: Joshua Edward Barnes Rank: R5

## 1 Introduction

Workload Distribution

Research	Teaching	Service	Support
20 %	25 %	55 %	0 %

Citations

2008	2009	2010
311/378	330/423	388/573

I returned from sabbatical in 08/2008 and continued in my role as chair of the IfA’s graduate program until 06/2010. During Fall 2010 I was often called to serve as acting graduate chair. I do theoretical research on galaxy mergers and numerical modeling. I teach graduate and undergraduate courses and serve on several committies related to graduate education. According to ADS, my Hirsch index is 28. My most cited paper has 910 citations; in 2010 it was cited 65 times.

## 2 Research Activities

### 2.1 Research Accomplishments + Awards, Prizes, etc.

- The main goal of my recent research is to develop more realistic numerical models of specific merging galaxies. This is intended (a) to counter the trend toward “generic” merger surveys, which sample some range of encounter parameters with the primary aim of reproducing the general characteristics of galaxy mergers, and (b) to take advantage of the wealth of observational data available at the IfA. Among the technical milestones necessary, I have recently developed more realistic mass models for initial galaxies, implemented a Monte-Carlo treatment of bidirectional star-gas recycling, and created simulations combining dynamical and stellar population modeling.
- To model real galaxy mergers, we need to know the initial conditions. The “Identikit 1” modeling scheme was developed as a way to rapidly explore the enormous parameter space and find the initial conditions necessary to reproduce the observed morphology and kinematics of a pair of merging galaxies. Subsequently, I found that this technique also defined a mapping back in time from the observed morphology and kinematics of tidal features to initial disk orientations; a paper on the “Identikit 2” algorithm was submitted in Fall 2010 (in press).
- Many elements of this research program appear in a study of the merger remnant NGC 7252 by my former student L. Chien (now at STScI). As of Fall 2010, I have ongoing projects to model additional systems, including Arp 256 and NGC 4038/9 (w/ L. Chien), NGC 34 (w/ X. Fernandez, J. van Gorkom, F. Schwizer), and a sample of other IR-luminous mergers (w/ G. Privon, A. Evans, J. Hibbard, M. Whittle).
- The Identikit technique, in which a single simulation can simultaneously produce results for all possible initial disk orientations, also has interesting theoretical applications; one example is to estimate stellar mass ejected in tidal tails (w/ K. Johnston, M. Teyssier).

## 2.2 Publications – Past 3 Years

### Peer Reviewed Articles Published, in Press or Submitted

- [1] **Barnes, J.E.** 2010, “Identikit 2: An Algorithm for Reconstructing Galaxy Collisions”, *MNRAS*, submitted (accepted 01/2011)
- [2] Fernandez, X., et al. 2010, “A Radio Perspective on the Wet Merger NGC 34”, *AJ*, **140**, 1965
- [3] Chien, L.-H., **Barnes, J.E.** 2010, “Dynamically driven star formation in models of NGC 7252”, *MNRAS*, **407**, 43
- [4] Inami, H., et al. 2010, “The Buried Starburst in the Interacting Galaxy II Zw 096...”, *AJ*, **140**, 63
- [5] Rupke, D., Kewley, L., **Barnes, J.E.** 2010, “Galaxy Mergers and the Mass-Metallicity Relation...”, *ApJ*, **710**, 156
- [6] Armus, L., et al. 2009, “GOALS: The Great Observatories All-Sky LIRG Survey”, *PASP*, **121**, 880
- [7] Veilleux, S., et al. 2009, “Spitzer Quasar and Ulig Evolution Study (QUEST). IV...”, *ApJS*, **182**, 628
- [8] **Barnes, J.E.**; Hibbard, J.E. 2009, “Identikit 1: A Modeling Tool for Interacting Disk Galaxies”, *AJ*, **137**, 3071
- [9] Evans, A.S., et al. 2008, “Off-Nuclear Star Formation and Obscured Activity in the Luminous Infrared Galaxy NGC 2623”, *ApJL*, **675**, L69

### Conference Proceedings (Invited and Contributed Papers)

- [1] Rupke, D. Kewley, L., **Barnes, J.** 2010 “Redistribution of Metals in Interacting Galaxies” *Galaxy Wars: Stellar Populations and Star Formation in Interacting Galaxies*, ASPC **423**, 355
- [2] Pizagno, J., et a. 2008, “Morphology of Luminous Infrared Galaxies”, *Formation and Evolution of Galaxy Disks*, ASPC **396**, 247

### Astronomy Meeting Abstracts, Posters, and IAU Circulars

- [1] Rupke, D., Kewley, L., **Barnes, J.** 2010 “The Impact of Interactions on Galaxy Metallicity Distributions”, *BAAS*, **42**, 478
- [2] Chien, L.-H., **Barnes, J.E.** 2009 “Star Formation History Of NGC 7252”, *BAAS*, **41**, 423

### Telescope Bulletin Articles, Book Reviews, Popular Articles, & Non-Refereed Work

- [1] N/A

### Books and Book Chapters

- [1] N/A

## 2.3 Extramural Grants & Other Funding – Past 3 Years

Table 1: Existing Funding

Date	Amount	Role	Agency	Description
09/01/07–08/31/09	\$47,019	CoI*	STScI	“UV Survey of LIGS...”

\* — PI was Aaron S. Evans, Stony Brook. Dollar amount is IfA’s share.

Table 2: Pending Proposals

Date	Amount	Role	Agency	Description
N/A	N/A	N/A	N/A	N/A

Table 3: Unsuccessful Proposals

Date	Amount	Role	Agency	Description
N/A	N/A	N/A	N/A	N/A

### 3 Teaching Activities

#### 3.1 Postdocs, Graduate Students and Other students supervised

Person	Position	Dates	Description
L.-H. Chien	PhD student	S08–F09	Dissertation: Merger Star Formation History
J. Kartaltepe	PhD student*	S08–S09	Dissertation: Multi- $\lambda$ study of COSMOS ULIGs
V. U	PhD student*	S09–now	Dissertation: Kinematics & Energetics of LIGs
Z. Gazak	PhD student*	F10–now	Dissertation: Extragalactic Red Supergiants
G. Privon <sup>†</sup>	PhD student*	F10–now	Dissertation: Atomic & Molecular Gas in LIRGs
A. Roussanova	Grad student	F09–S10	Astr 699 Project: Wide Galaxy Encounters

\* — JB serves as a dissertation committee member.

<sup>†</sup> — Astronomy Department, University of Virginia.

#### 3.2 Regular Courses Taught During the Past 3 Years

Course	Date	Credit	No	Dept	Staff	Title
A110L	F08	1	19		4.76	Astronomy Laboratory
A626	S09	3	18		4.00	Galaxies
A699	F09	2	1			Directed Research
A110	S10	3	68		4.33	Survey of Astronomy
A699	S10	2	1			Directed Research
A110L	F10	1	22		4.47	Astronomy Laboratory

#### 3.3 Comments on Teaching

While [http://www.ifa.hawaii.edu/gradprog/internal/faculty\\_responsibilities.htm](http://www.ifa.hawaii.edu/gradprog/internal/faculty_responsibilities.htm) states “the graduate chair may undertake a reduced teaching load”, this was seldom an option. To make up for shortfalls in the teaching roster, I taught during three of my four semesters as grad chair.

In S03 I introduced the first section of Astr 110L; I continue to support Astr 110L by maintaining lab equipment, developing new exercises, and meeting with faculty teaching this course. Like most labs, Astr 110L is a 1-credit class, but requires as many contact hours as a lecture class; preparation can be time-consuming since lab activities must be adapted to visible astronomical objects and to weather conditions.

In addition to teaching at UH, I also gave two invited lectures on “Dynamics of Galaxies” at the *Frontiers in Numerical Gravitational Astrophysics* international school in Erice, Italy.

## 4 Service Activities

### 4.1 IfA Committees

Year	Committee	Wkload	Description
08–10	QUAL	100 hr/yr	Graduate Qualifying Exam Committee
08–10	GROG	50 hr/yr	Graduate Research Oversight Group
09–10	ADMIT	200 hr/yr	Graduate Admissions Committee
08–10	FAC	30 hr/yr	Faculty Advisory Committee
08–10	AWARDS	10 hr/yr	IfA Awards Committee
2009	PROCESS	50 hr	Prioritization Process Advisory Committee
2010	NRC	20 hr	NRC Postmortem Analysis

### 4.2 UH Committees

Year	Committee	Wkload	Description
08–09	NS CHAIRS	30 hr/yr	Natural Science Department Chairs (Astr. Rep.)

### 4.3 Community / Local Committees

Year	Committee	Wkload	Description
N/A			

### 4.4 National / International Committees / Journal Editorships

Year	Comm/Journal	Wkload	Description
N/A			

### 4.5 Invited talks (Conf, Dept. Colloquia, etc.), Public Outreach Events

Date	Event	Location	Description
01/17/08	Colloquium	Yukawa Inst., Kyoto	Matching Models to Merging Galaxies. . .
06/04/08	Colloquium	ASIAA, Taipei	Identikit 1: A Modeling Tool. . .
07/03/08	Invited Review	Majorana Found., Erice	Dynamics of Galaxies
07/14/08	Colloquium	Astro. Dept., Kyoto	Photo-Dynamic Galaxy Models
09/30/09	Colloquium	IfA, Honolulu	Identikit 2: An Algorithm. . .
10/16/09	Colloquium	Columbia U., NYC	Identikit 2: An Algorithm. . .
07/06/10	Colloquium	NAOJ, Tokyo	Identikit 2: An Algorithm. . .

## 4.6 Comments on Service

As graduate chair, my regular duties included the following:

- **Teaching assignments:** Assigned graduate and undergraduate teaching duties for the S09, F09, S10, and F10 terms. Scheduled graduate courses. Maintained an on-line database of teaching loads and assignments. Coordinated and processed undergraduate and graduate evaluations; posted course evaluation data on-line.
- **Graduate admissions:** Selected and chaired committees to review applications to the graduate program (2009, 2010). Served as the primary email contact with most applicants. Signed admissions offers and handled necessary paperwork with Graduate Admissions office. Helped organize and participated in visits by proto-grads.
- **GROG** (Graduate Research Oversight Group): Served “ex officio” as grad chair (F08–S10). Reorganized GROG to handle workload due to 2008 class (S09). Served as chair for several months after reorganization and again in 2010. Collected proposals, progress reports, and research papers from students; solicited feedback from advisors; distributed assignments to reviewers; scheduled and ran research talks.
- **Qualifying exams:** Selected & organized qual exam committee (2008, 2009). Served as chair in 2009, core member in 2010, and invited participant in 2008. As chair, defined standards for passing, reviewed oral and written questions, scheduled exams, met with students.
- **Student progress:** Attended comprehensive exams and dissertation defenses, completed student progress forms, and filed them with the Graduate Division. Provided information on completed degree requirements to the Graduate Records office.
- **Prioritization process:** Served on Prioritization Process Advisory Committee. Acted as liaison/buffer between IfA and Natural Sciences. Collected data for “Undergraduate Astronomy” and “Graduate Astronomy Degree” programs; wrote supporting text and entered rubric data for both. Tracked status of IfA programs during prioritization.
- **Natural Sciences Chairs:** Attended monthly meetings as Astronomy representative of Department of Physics and Astronomy [sic]. Provided data on IfA graduate program and undergraduate teaching to College of Natural Sciences on request.
- **Graduate assistantships and employment:** Monitored employment status of IfA students. Recruited students for TA positions. Selected students to teach summer classes.
- **Web pages:** Following major re-write of graduate program web pages (2007), performed routine updates of students, courses, course schedules, deadlines, CRNs.
- **Course equivalence forms:** Reviewed course descriptions and determined equivalent courses for undergraduate students transferring to UH Manoa with astronomy credits from other institutions.

## 5 Support Activities

N/A