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The EINSTEIN On-Line Service

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Abstract. The *Einstein* On-Line Service (EOLS) is a simple menu-driven system which provides an intuitive method of querying over one hundred database catalogs. In addition, the EOLS contains over 30 CD-ROMs of images from the *Einstein* X-ray Observatory which are available for downloading. The EOLS provides all of our databases to the NASA Astrophysics Data System (ADS) and our documents which describe each table are written in the ADS format. In conjunction with the IAU working group on Radioastronomical Databases, the EOLS serves as an experimental platform for on-line access to radio source catalogs. The number of entries in these catalogs exceeds half a million.

1. Introduction

In 1989 January, SAO established an on-line service to help astronomers prepare *ROSAT* proposals by providing access to the preliminary source list from the "*Einstein* Observatory Catalog of IPC X-ray Sources." In the intervening years, we have updated the source list, added to the documentation, included many more *Einstein* databases as well as a number of tables from other wavebands, provided access to images for downloading from all of the *Einstein* CD-ROMs, and installed new software for more sophisticated filtering and retrieval. Although we have improved the functionality and made significant additions to the databases, we still maintain a simple menu interface accessible from any type of terminal. An instruction manual does not exist: the on-line help facility provides the necessary information.

2. Database Retrieval Options

The EOLS provides three options for data retrieval. The "database query" is a menu-driven system which allows users to build their own query and select which output columns should be retrieved. The "quick query" provides an output format which requires only one specification of selection criteria, and returns up

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to 79 characters per row (pre-selected by us). The "multiple quick query" is a positional search on several tables. We have endeavored to make the selection process simple and the easiest option is to select one or more affinity groups. However, the user can specify particular tables from different groups by choosing the "Custom" option or choose to select all tables.

Here are six of the 30 rows retrieved from 105 catalogs with a single query:

```
-------------------------------- eos_source ---------------------------------
| SEQ |FLD|CAT |     RA    |    DEC   |+/-|COR C/S|       |     |      |    |   |
|  #  | # | #  | h  m  s   | d  '  ''|asc|cts/sec|  +/-  | S/N |SIZCOR|RECO|ID |
|-----|---|----|----------|---------|---|-------|-------|-----|------|----|---|
| 3042|  1|4594|22 17 41.3|+08 44 55| 36|2.0e-02|4.4e-03|  4.4|   1.1|   0|Q  |
-----------------------------------------------------------------------------
Total: 1 rows retrieved.

------------------------------ qso_veron85 ------------------------------
|            |    RA    |   DEC   |     |     | radio |  fdr6  | fdr11  |
|        name| h  m  s  | d  '  ''|    z| vmag|source?|  (cgs) | (cgs)  |
|------------|----------|---------|-----|-----|-------|--------|--------|
|            |22 17 39.4|+08 44 56|0.228|17.60|    yes|7.50e-25|0.00e+00|
|            |22 17 42.5|+08 45 24|0.623|18.60|    yes|7.00e-25|0.00e+00|
------------------------------------------------------------------------
Total: 2 rows retrieved.

----------------------------- rad_6cm_bwe91 ------------------------------
|          |    RA    |   DEC   |S(4.85GHz)|Extension|Spectral|Separation|
|   Name   | h  m  s  | d  '  ''|   (mJy)  |   Flag  | Index  |   Flag   |
|----------|----------|---------|----------|---------|--------|----------|
|2217+0844 |22 17 42.0|+08 44 44|       121|         |    -0.6|          |
-------------------------------------------------------------------------
Total: 1 rows retrieved.

--------------------------------- rad_gb87 ----------------------------------
|    RA    |RA+/-|   DEC   |DEC+/-|S(4.85)|S +/-|EXT|WARN|CONF|FWHM|FWHM| PA|
| h  m  s  | sec |d   '  ''| arcs | (mJy) |(mJy)|FLG|FLAG|FLAG|MAJ |MIN |   |
|----------|-----|---------|------|-------|-----|---|----|----|----|----|---|
|22 17 41.7|  0.8|+08 44 45|    13|    125|   18|   |    |    |1.20|1.01|-71|
----------------------------------------------------------------------------
Total: 1 rows retrieved.

---------------------------------- rad_pks90 ----------------------------------
| +/- |   |    |      |fdr1410 |fdr2700 |fdr5000 |    RA    |   DEC   |       |
| arcs| id| mag|     z|   (Jy) |   (Jy) |   (Jy) | h  m  s  | d  '  ''|  alias|
|-----|---|----|------|--------|--------|--------|----------|---------|-------|
|   20|Xs |    |      |        |   0.230|        |22 17 39.7|+08 44 58|4C08.66|
-------------------------------------------------------------------------------
Total: 1 rows retrieved.
```

3. Downloading X-Ray Images

All of our *Einstein* CD-ROMs are permanently available for downloading images. They may be obtained with ftp or with the VMS "copy" command. As of 1994 June 30, we have:

- the 2E Catalog of IPC X-ray Sources: FITS smoothed arrays
- the Database of HRI X-ray Images: FITS photon arrays
- the IPC Slew Survey: 1991 Jan 1
- the HRI Images in Event List Format: FITS binary tables
- the IPC Images in Event List Format: FITS binary tables
- the IPC Unscreened Data Archive: FITS binary tables

4. Other Features

There are several important features of the EOLS service, including a low maintenance operation, and the ADS connection. The EOLS provides all of our databases to the ADS, and our documents that describe each table are written in the ADS format. Documentation is available for each database table and provides extensive detail in some areas (e.g., Vol. 1 of the IPC catalog), archival material such as the "*Einstein* Revised User's Manual," and "help" files which provide information on system operations. A communication facility is also available, and features a bulletin board (including *ROSAT* news) and an e-mail facility for sending yourself documents and the results of database searches. Finally, a set of tools for precessing coordinates and column densities of galactic H I (north of Dec = $-40°$) are available.

There are four methods to log onto the EOLS:

1. Internet — telnet to *einline.harvard.edu*
2. decnet — set host 6714
3. modem — dial (617) 495–7047 or (617) 495–7048
4. mosaic — http://hea-www.harvard.edu/einline/einline.html

Once successful, the login name is "einline"; no password is required. Note: since UNIX is case sensitive, make sure you use lower case when logging in!

5. The Radio Source Catalog Initiative

For many years we have noticed the difficulty of finding radio source data in public archives or on-line databases. In 1991, the IAU Working Group on "Radioastronomical Databases" was formed with one of us (H.A.) as the chair. By now the Working Group has secured some 130 catalogs of radio sources with a total of $\sim 560,000$ entries. Although the working group recognized that a long term solution to this problem should be provided by an on-going commitment from the National Radio Astronomy Observatory (NRAO) or the Strasbourg Astronomical Data Center (CDS), the EOLS volunteered to serve as an experimental platform for access to the catalog collection. This "provisional" solution is now by far the most complete on-line facility for radio source data, offering access to 63 radio catalogs with 520,000 searchable entries. Contributions of

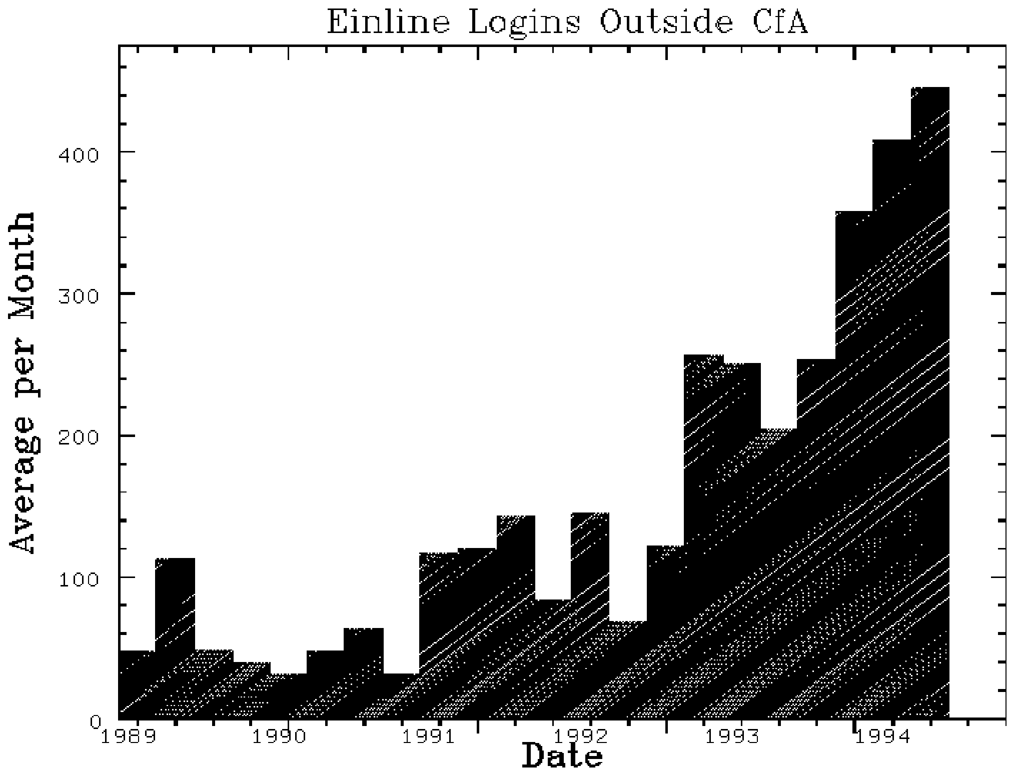

Figure 1. Logins per month from outside CfA: 1989–1994.

new data tables are welcome, but can only be incorporated into the system if authors provide proper documentation and formatted ASCII tables.

6. Statistics of Usage

The histogram in Figure 1 shows the average number of logins per month from outside the Center for Astrophysics from 1989 to mid-1994.