

Avant-première privée

Online science
with the new *XMM-Newton*
catalog website

Ivan Zolotukhin

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β

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catalog website**

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Outline

- *XMM-Newton* source catalog
- Website: what batteries inside?
- New development model (citizen science)
- Demo

XMM-Newton catalog

- XMM-Newton is X-ray observatory by ESA launched in Dec 1999
- Large FOV: ~70 sources / pointing
- Largest X-ray source catalog: 2% of the sky, 530k detections, 370k sources = “table of contents” of *XMM-Newton* archive



XMM-Newton catalog

LEDAS:
ARNIE services Leicester Database and Archive Service

ARNIE Index
ARNIE Quick Help
ARNIE Tutorial

Search...
All Databases
All Helpfiles

For comments or help, e-mail:
ledas-help@star.le.ac.uk

Database: 3XMM Database HELP
XMM Third Serendipitous Source Survey Data Release 4: 3XMM-DR4

[Database Index](#) | [Basic Search](#) | [Advanced Search](#)

Name Resolver HELP **Search Co-ordinates** HELP

Name: Co-ords:

RESOLVE NAME
SUBMIT QUERY

Co-ordinate system:
 Equatorial Ecliptic Galactic
Equinox: 1950 2000

Search Type HELP **Output Options** HELP

Cone search, radius: arcmin.
 Square search, width: arcmin.
 Rectangle search, size: x arcmin

Display Columns HELP

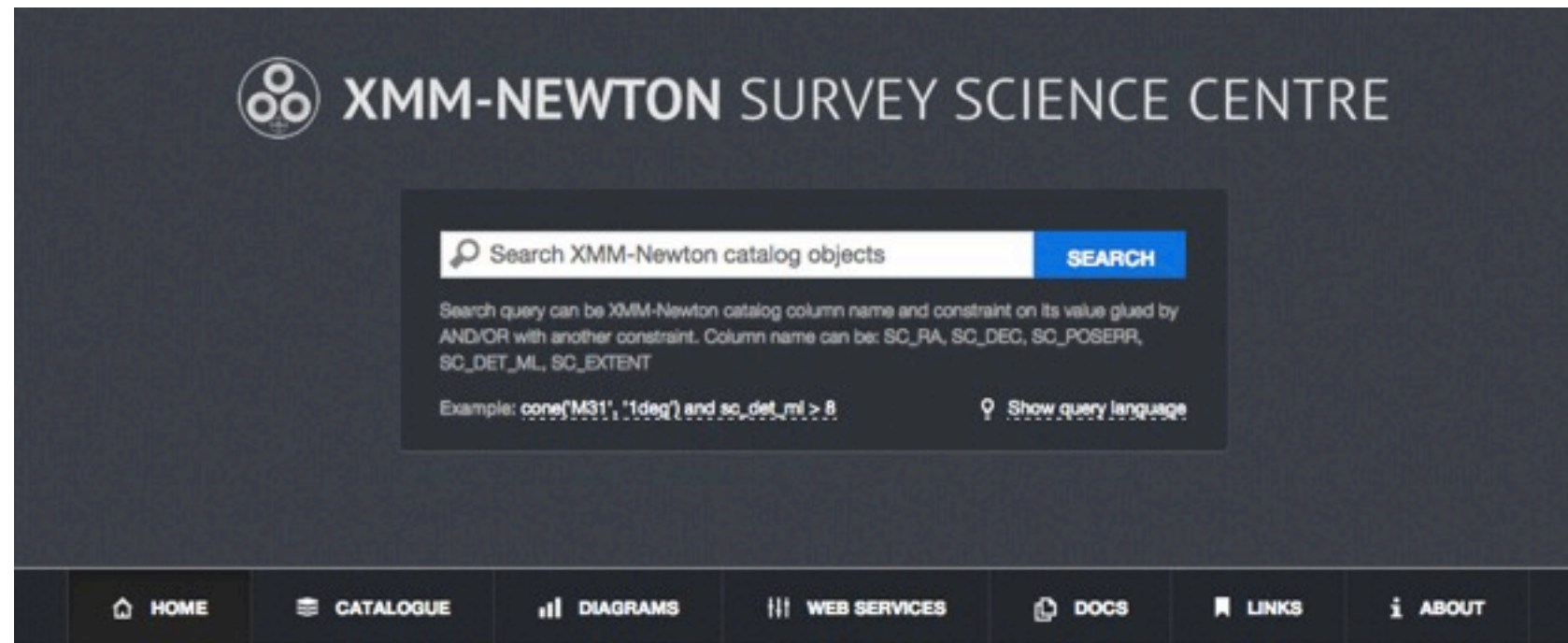
Display **default** table columns
 Display **all** table columns

Output coordinates in:
 Decimal Sexagesimal
Output system:
 Equatorial Ecliptic Galactic
Output epoch:
 J2000 B1950
Output format:
HTML Table

Output number of lines: **SUBMIT QUERY**

before

XMM-Newton catalog



The screenshot shows the top section of the XMM-Newton Survey Science Centre website. It features a dark header with the XMM-Newton logo and the text 'XMM-NEWTON SURVEY SCIENCE CENTRE'. Below this is a search bar with the placeholder text 'Search XMM-Newton catalog objects' and a blue 'SEARCH' button. Underneath the search bar, there is a brief explanation of search queries: 'Search query can be XMM-Newton catalog column name and constraint on its value glued by AND/OR with another constraint. Column name can be: SC_RA, SC_DEC, SC_POSEPP, SC_DET_ML, SC_EXTENT'. An example query is provided: 'cone('M31', '1deg') and sc_det_ml > 8'. A link 'Show query language' is also present. At the bottom of the header is a navigation menu with icons and labels for 'HOME', 'CATALOGUE', 'DIAGRAMS', 'WEB SERVICES', 'DOCS', 'LINKS', and 'ABOUT'.

NEWS

23
Nov 2014

28th XMM-Newton SSC consortium meeting to be held 22-23 January 2015 at MSSL, London, UK

12
Mar 2014

28th XMM-Newton SSC consortium meeting to be held 10-11 May 2014 at AIP, Potsdam, Germany

SSC OVERVIEW

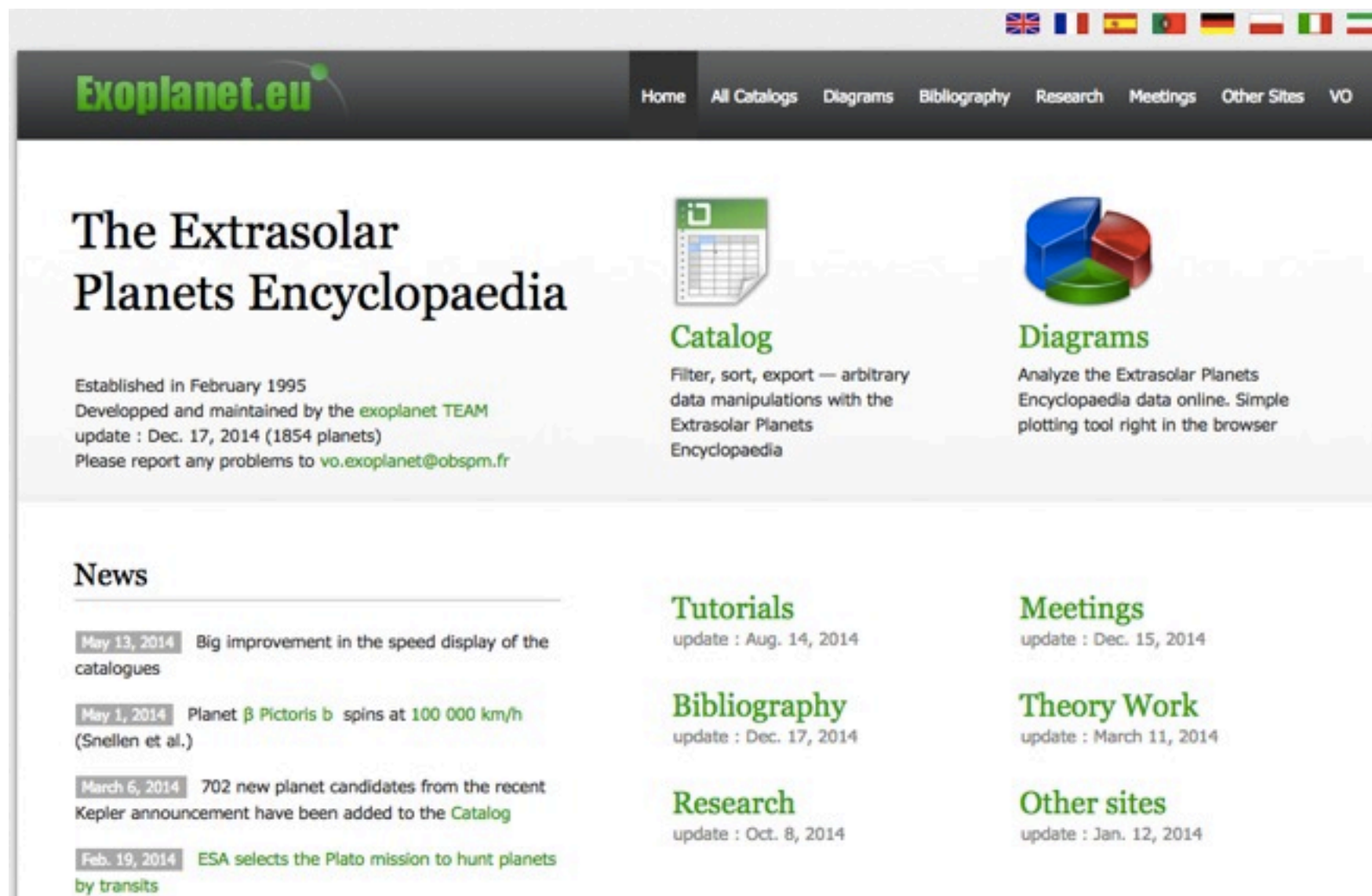
Launched in 1999, the XMM-Newton satellite is the major European X-ray observatory-class telescope, carrying also a co-aligned UV/optical monitor telescope, that is operated by the European Space Agency (ESA). The XMM-Newton Survey Science Centre (SSC) has responsibilities within the XMM-Newton project in four main areas:

- ✓ The compilation of the XMM-Newton Serendipitous Source Catalogue.
- ✓ The follow-up/identification programme for the XMM-Newton serendipitous X-ray sky survey: the

after

Legacy

Reincarnation of the most popular catalog website in France, <http://exoplanet.eu>



The screenshot shows the Exoplanet.eu website. At the top, there is a navigation bar with the logo "Exoplanet.eu" and a menu with items: Home, All Catalogs, Diagrams, Bibliography, Research, Meetings, Other Sites, and VO. To the right of the menu are several small flags representing different countries. Below the navigation bar, the main content area is divided into several sections. On the left, there is a large heading "The Extrasolar Planets Encyclopaedia" with a sub-heading "Established in February 1995" and a description: "Developped and maintained by the [exoplanet TEAM](#) update : Dec. 17, 2014 (1854 planets) Please report any problems to vo.exoplanet@obsprm.fr". To the right of this section are two icons: a calendar icon labeled "Catalog" with the text "Filter, sort, export — arbitrary data manipulations with the Extrasolar Planets Encyclopaedia" and a 3D pie chart icon labeled "Diagrams" with the text "Analyze the Extrasolar Planets Encyclopaedia data online. Simple plotting tool right in the browser". Below these sections is a "News" section with four entries, each with a date and a brief description. To the right of the News section are four more sections: "Tutorials" (update: Aug. 14, 2014), "Meetings" (update: Dec. 15, 2014), "Bibliography" (update: Dec. 17, 2014), and "Theory Work" (update: March 11, 2014). At the bottom right, there is a section for "Other sites" (update: Jan. 12, 2014).

Exoplanet.eu Home All Catalogs Diagrams Bibliography Research Meetings Other Sites VO

The Extrasolar Planets Encyclopaedia

Established in February 1995
Developped and maintained by the [exoplanet TEAM](#)
update : Dec. 17, 2014 (1854 planets)
Please report any problems to vo.exoplanet@obsprm.fr

Catalog

Filter, sort, export — arbitrary data manipulations with the Extrasolar Planets Encyclopaedia

Diagrams

Analyze the Extrasolar Planets Encyclopaedia data online. Simple plotting tool right in the browser

News

May 13, 2014 Big improvement in the speed display of the catalogues

May 1, 2014 Planet β Pictoris b spins at 100 000 km/h (Snellen et al.)

March 6, 2014 702 new planet candidates from the recent Kepler announcement have been added to the [Catalog](#)

Feb. 19, 2014 [ESA selects the Plato mission to hunt planets by transits](#)

Tutorials

update : Aug. 14, 2014

Meetings

update : Dec. 15, 2014

Bibliography

update : Dec. 17, 2014

Theory Work

update : March 11, 2014

Research

update : Oct. 8, 2014

Other sites

update : Jan. 12, 2014

Technology stack

- RDMBS: **PostgreSQL**



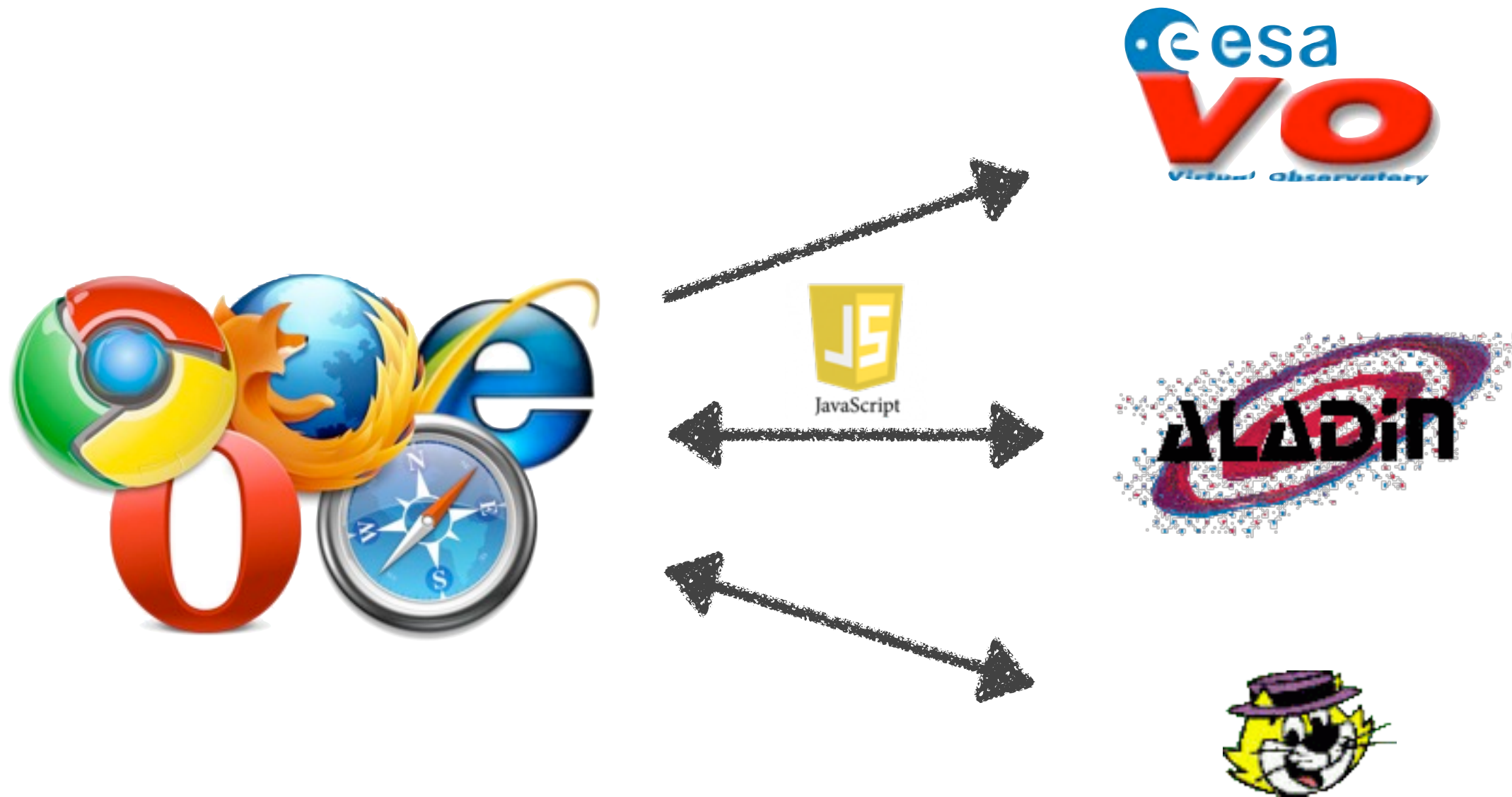
- Application language: **Python**



- Web framework: **Django**



SAMP in a browser



AstroTools library: <http://goo.gl/zyF0id>

X-ray spectral fitting

- Unique web implementation of a complex thing: source, background, RMF, ARF

- Wrapper over Sherpa



- Powered by Xspec



Query language

Boolean expressions instead of endless forms (think Google)

Query examples

- `M82` – select sources in 10 arcmin vicinity of M82 center
- `cone('M31', '1deg') AND sc_det_m1 < 100` – select faint X-ray sources not
- `is_ulx = true AND n_detections > 2` – select ULXs which were detected r
- `iauname IN {"3XMM J053406.7+220337", "3XMM J053406.6+220438"}` – select
- `srcid IN {3, 4}` – select specific sources by their source IDs (useful for la

More batteries

- Web sessions (personalization)

- Name resolver





- JavaScript diagrams (jQuery, Angular)

- Java WebStart of Aladin and TOPCAT



New development model

- High-level full-time employed IT engineers
a.k.a. volunteers   **git**
- Coordination through Bitbucket (git)
- New type of **citizen science**? Unlimited source of free manpower?

New development model

- **Alexey Sergeev**, Moscow, 10+ years of experience – design
- **Maxim Chernyshov**, Vladivostok, 10+ years of experience but 1st Django project – backend
- **Askar Timirgazin**, Moscow, 5 years of experience – frontend

New development model

- Project duration: ~1 yr
- My time: 5% FTE
- Volunteers time: up to 3 months FTE
- This team is so far unique, but there are much more citizen science enthusiasts!

Demo

The future

- Official release: early 2015
- A&A Research Note
- *XMM-Newton* photon database – database of all photons ever registered by the *XMM-Newton* (~100 billions)