

Codes TITAN+NOAR and VO

TITAN team

Loic Chevallier (developer, main user),

Anabela C. Goncalves (main user),

Suzy Collin (idea), Anne-Marie Dumont (former developer),

Olivier Godet, René Goosmann (NOAR), Martine Mouchet

Collaborations (other users)

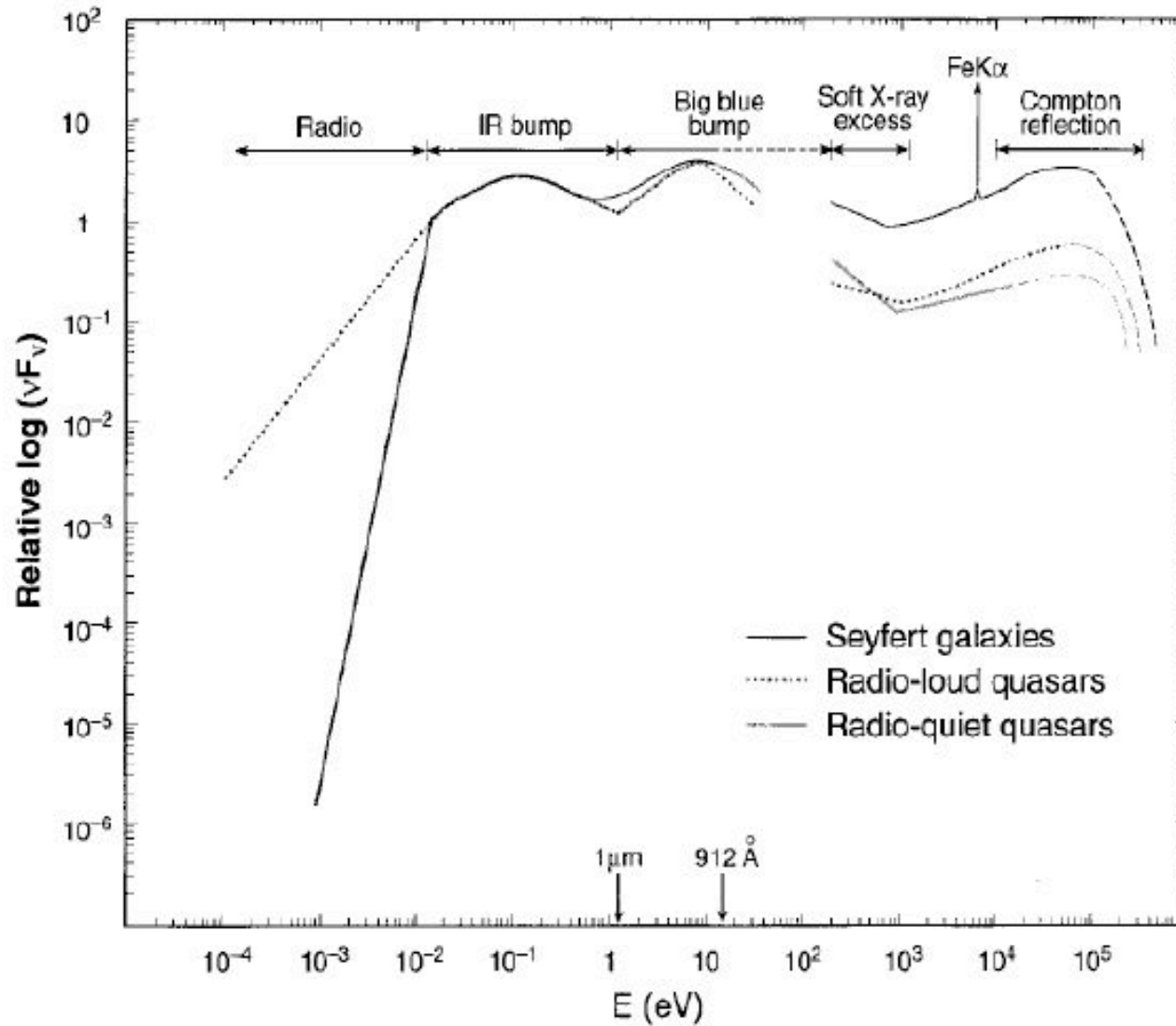
Bozena Czerny, Agata Rozanska (CAMK)

Kajal Ghosh...

Outline

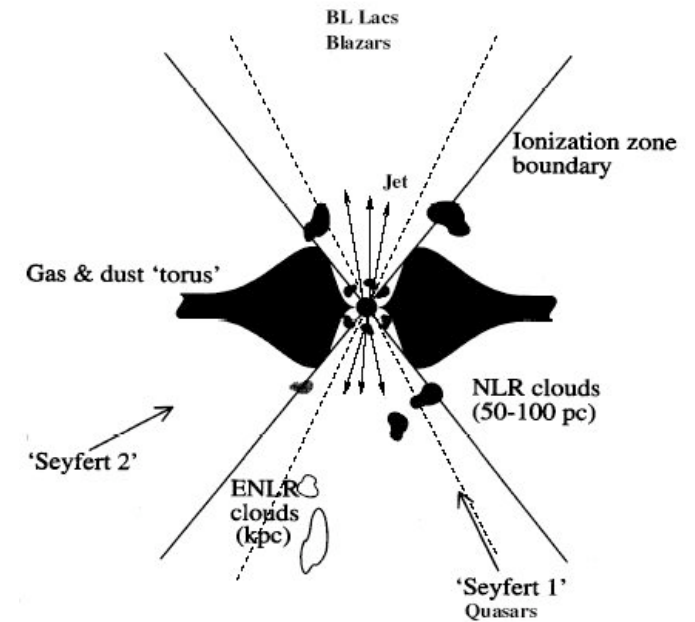
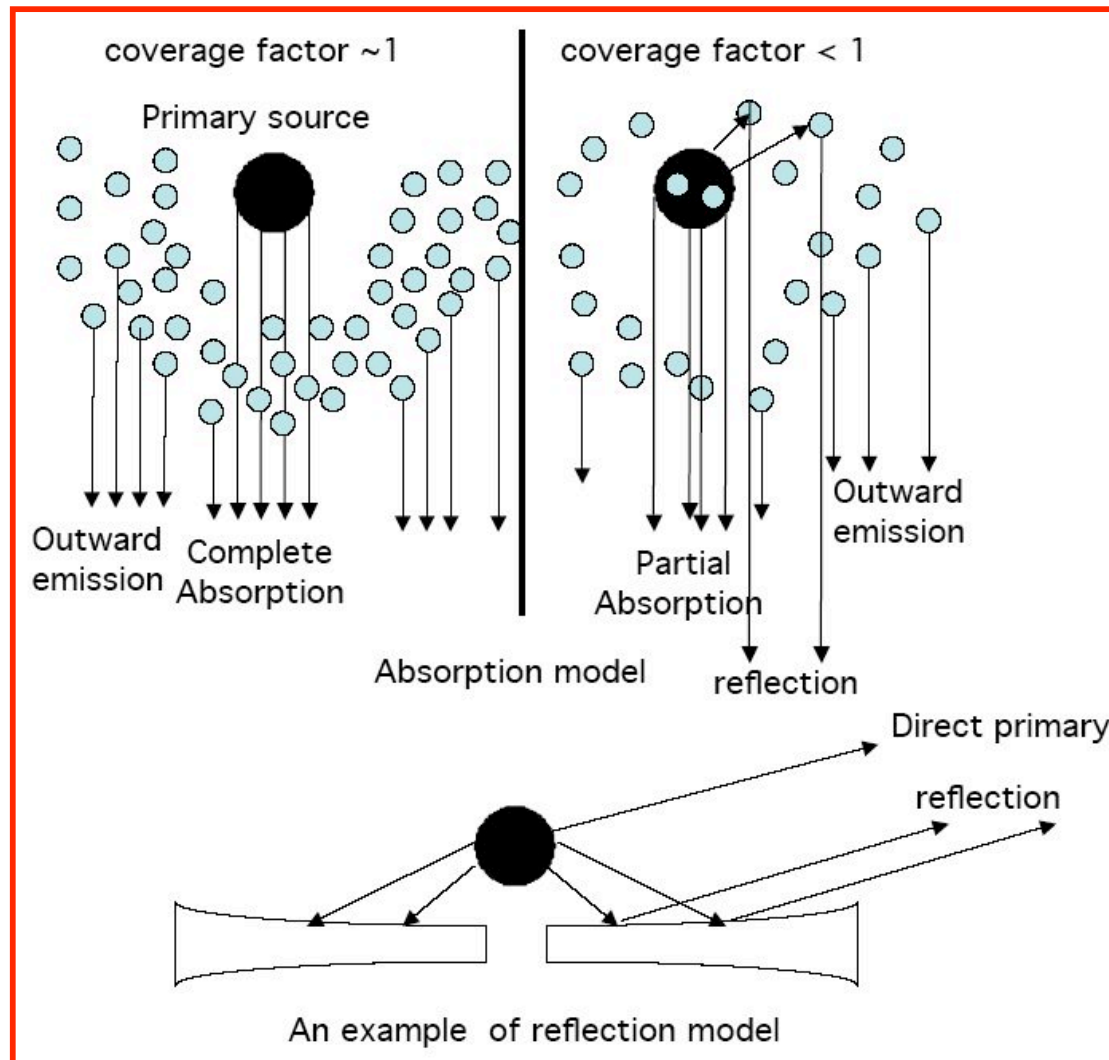
- AGN physics
- Codes TITAN + NOAR capabilities (ALI radiative transfer)
- Standard web interface (in progress)
- Future work
- Grid of models (Anabela Gonçalves)

AGN typical continuum



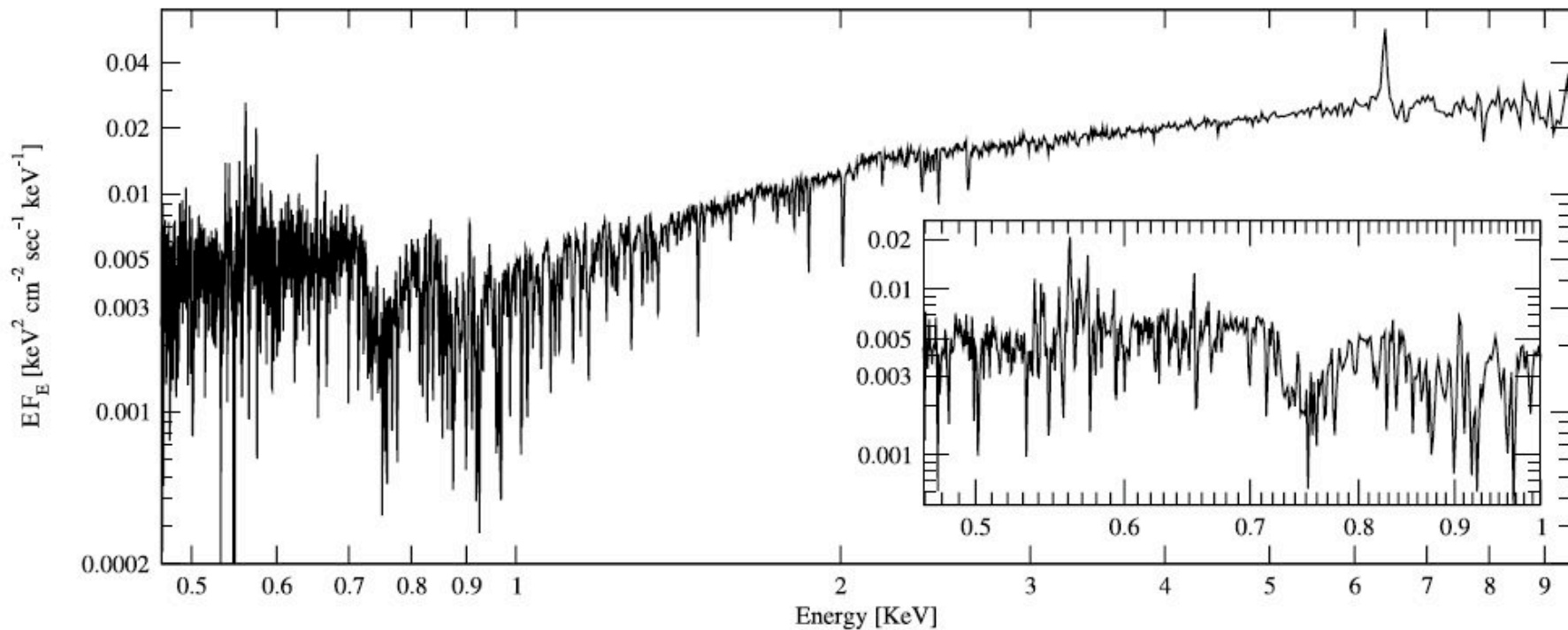
Koratkar & Blaes (1999)

Geometry: transmitted, Outward, reflected fluxes



Photoionized media: various codes

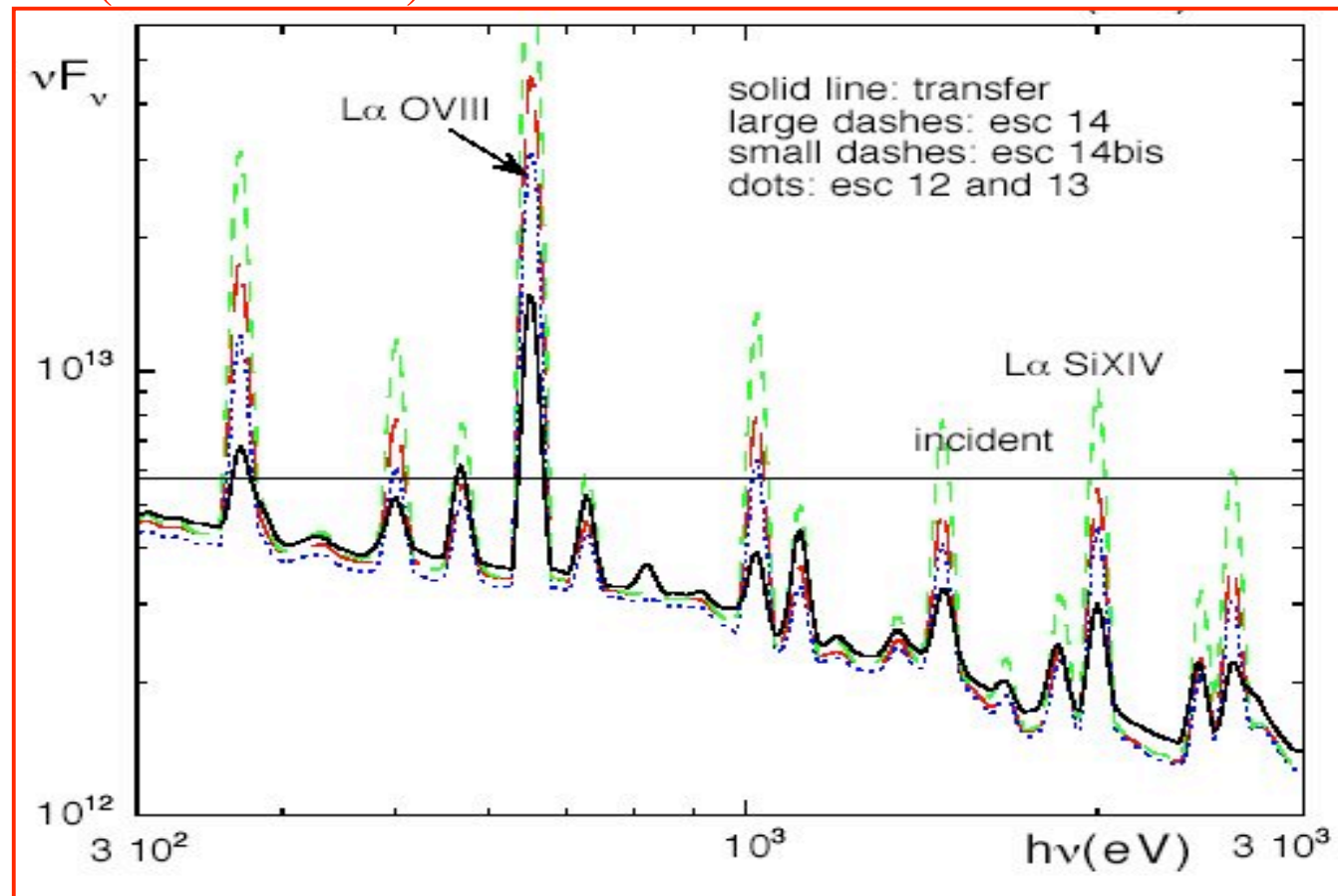
- XMM, Chandra : high-resolution ($R=10-1000$), detailed atomic data (**XSTAR**, **Cloudy**, **TITAN**)
- thick absorbing medium line of sight: radiative transfer (**TITAN**)



NGC 3783: Sy1 (absorption), Kaspi et al., ApJ (2002)

Transfer: Escape probability vs. ALI for lines (thick medium)

- typical model for the region emitting the UV-X “continuum” of AGN
- (x10) on resonance lines, because line photons are reabsorbed.
 $\tau_{\text{es}} > 0.001$ (CD 10^{20} cm^{-2})



Dumont et al., A&A (2003)

TITAN (+NOAR) code

- Photoionized non-LTE medium
- Plane-parallel 1D
- 2-stream -> ALI (2002)
- Gives consistent T, pops., flux (outward, reflected) in all directions
- Local and global radiative equilibrium
- Modes : constant density, gaseous pressure, total pressure
- NOAR = Monte Carlo, any geometry (accretion)

- 10 atoms: H, He, C, N, O, Ne, Mg, Si, S, Fe
- 102 ions, microturbulence
- Compton heating (NOAR)
- He-like : 15 levels + continuum (Godet et al., A&A 2004)

Accuracy order 10 % for the triplet

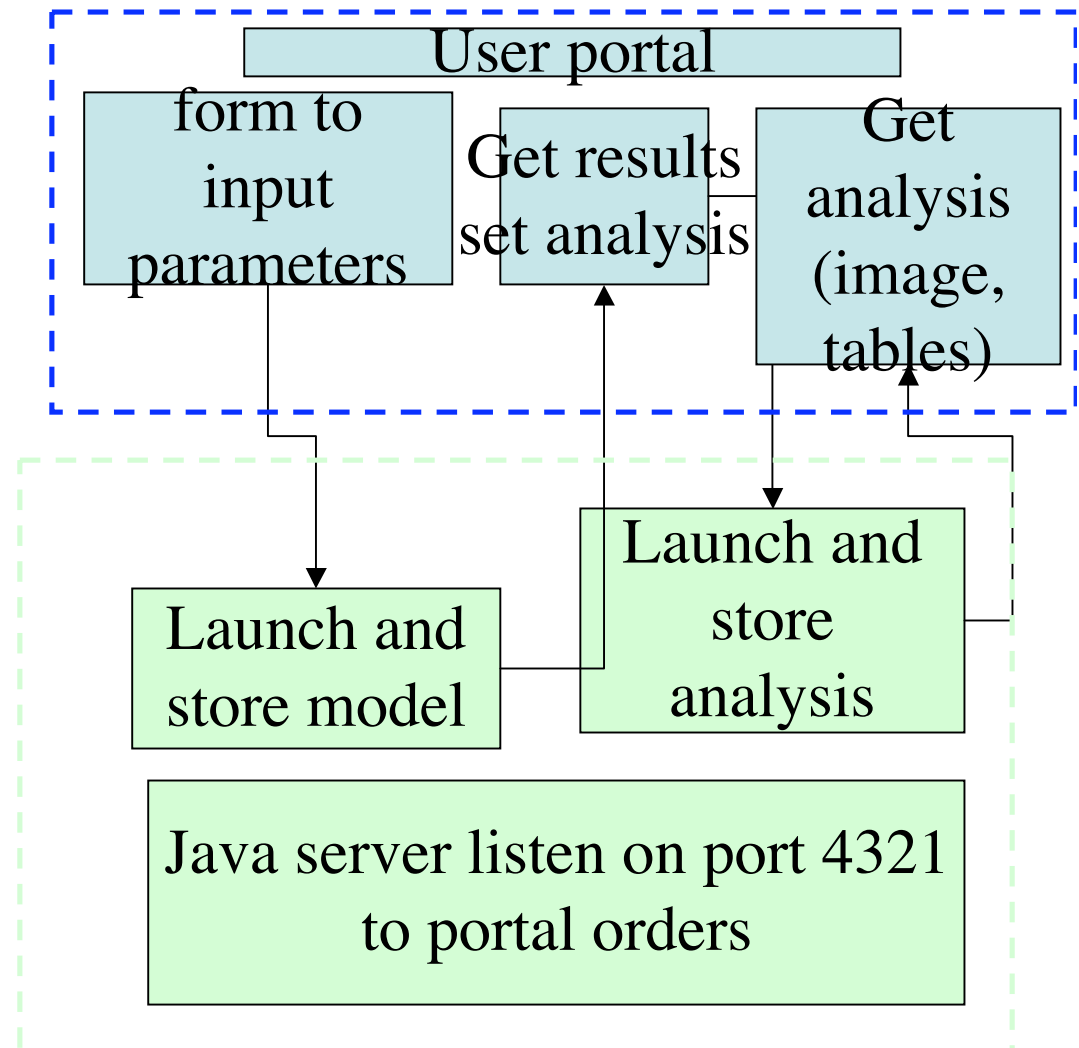
- Previous 11 levels model : 50 % accuracy (Coupé et al., A&A 2004)

-> XSTAR atomic data

- $\log CD < 26$, $5 < \log n_H < 14$, $1 < \log \xi < 4$
- $4 < \log T < 8$

Web interface - 1

- Observatory Paris, Simulations, Franck le Petit / Damien Guillaume,
- Launch models, tools to analyse and visualize
- User portal (client) + application server
- Java technology for communication, XML configuration files



Web interface - 2

- Vo.obspm.fr:8888/simulation/
- Private identified access
- List of applications



l'Observatoire
de Paris

Identification

Nom d'utilisateur: Ichevallier *

Mot de passe:

Soumettre



l'Observatoire
de Paris

Accueil

Bienvenue Ichevallier.

[Liste des exécutions en cours](#)

Nouveau calcul :

- [Calcul de pi](#)
- [Région de PhotoDissociation \(PDR\)](#)
- [PDR - Analyse des résultats](#)
- [TITAN : Modélisation des milieux photoionisés](#)
- [TITAN - Analysis of models](#)

Web interface - 3

- French or english form (browser dependent)



Portail de simulations nur

TITAN : Modélisation des milieux photoionisés

Ensembles de paramètres

Enregistrer l'ensemble de paramètres sous le nom:

Type de paramètres d'entrée [parfile]:

 * ?

Upload an input parameter file:

 aucun fichier sélectionné ?

Session name [titre]:

 * ?

Type of atomic data [fichatomic]:

 * ?

Upload an atomic data file:

 aucun fichier sélectionné ?

hydrostatic equilibrium [idens]:

 * ?

Surface hydrogen density (units cm) [nhinit]:

 * ?

Initial temperature (units K) [tinit]:

 * ?

Total column density (units cm⁻²) [coldens]:

 * ?

Turbulent velocity (units km/s) [vturb]:

 * ?

Index for a power-law density [dendex]:

 * ?

Distance from the central source (units cm) [rmincm]:

 * ?

Web interface - 4

- List of results, links



Portail de sim

Simulations numériques

Liste des exécutions en cours

Serveur : *media1.obspm.fr*

erreur de connexion

Serveur : *pythagore.obspm.fr*

erreur de connexion

Serveur : *titanic.obspm.fr*

Nom programme	Utilisateur	Date début	Date fin	En marche ?	Résultat
titan	Ichevallier	4/6/06 1:38 AM	4/6/06 1:38 AM	non	résultat

Web interface - Summary

- List of results, links, email to user
- Easy to install (cluster, local java, local programs on non-root account)
- Comparison with PDR: same parameter name, launch on cluster, one file of results: archive instead of bin
- Wished improvements: better form (titles), better name of items in results list, launch several models by a list of one input parameter



Port

Résultats de l'exécution

TITAN : Modélisation des milieux photoionisés

[Sortie standard](#)

[Erreur standard](#)

Fichier [titan_modele.tar.gz](#)

Fichier [toto](#)

- [TITAN - Analysis of models](#)

[Retour à la liste](#)

[Retour au portail](#)

Future work

- Atomic Data (XSTAR database: 1000 to 20000 lines), VO like PDR code ?
- Acceleration (GS/SOR, other, parallel)
- VO interface (AIDA, Astrogrid, ASAP), workflow (build grid of models, iteration TITAN/NOAR with intermediate fit of Compton heating)
- Definition of UCDs and DM
- Why VO?