

Exercise 4

General instructions: Follow these instructions, as they facilitate the revision of the exercises. The review takes into account that you always use the requested file names. Send **only** the files requested. Return your answers to your assistant as an e-mail entitled **TilaI,2017**. If you have not programmed before, choose only one of the programming languages (**octave/python**) and do not change it during the course. If you are sure that you want to try both languages, you can of course do the exercises of both languages. However return the exercises to your assistant in one language only.

- **Tehtävä 4a (emacs, L^AT_EX, ADS)**

Move in your directory `/home/username/latex/`

Start editing the sourcefile with the command `emacs H4aviitteet.bib &`

Copy using your mouse **from this ADS database** | [www](#) | following publications

Duquennoy et al., 1992, A&A, 254, L13

Goldman & Mazeh, 1994, ApJ, 429,362

Zahn, 1989, A&A, 220, 112

copy the information from **Bibtex entry for this abstract** one by one after each other in the file `H4aviitteet.bib`. Save the file `H4aviitteet.bib`.

Note: Copy everything between `@ARTICLE` and the last `}` symbol. Do not add or remove anything.

Start a new row after every entry.

After that change from the file `H4aviitteet.bib` labels of the articles like this:

`1992A&A...254L..13D`, to `Duq92`,

`1994ApJ...429..362G`, to `Gol94`,

`1989A&A...220..112Z`, to `Zah89`,

Copy the files `aa.bst`, `aa.cls` and `H4akesken.tex` from the course website to the same directory.

Copy the file to another file with the command `cp H4akesken.tex H4avalmis.tex`

From the file `H4avalmis.tex` edit following four sections:

`Oppi1` to `\citet{Duq92}`

`Oppi2` to `\citep{Gol94}`

`Oppi3` to `\citep{Zah89}`

`Oppi4` to `\citet{Gol94}`

Do the commands

`latex H4avalmis`

`bibtex H4avalmis`

`latex H4avalmis`

`latex H4avalmis`

`dvips H4avalmis -o`

Examine the result with the command `evince H4avalmis.ps &`

Requirement of the exercise: Exercise is ready when `latex H4avalmis` doesn't "crash" and the result is same as in the next page.

All these circumstances raise serious questions regarding the evolutionary and dynamical history of this system. As was noted by Duquennoy et al. (1992), the separation of the two components at periastron would be equivalent to that of a circular orbit with a period of just 3.5 d. This short timescale is similar to the expected tidal-shear timescale (Goldman & Mazeh 1994) and suggests tidal interaction at least during periastron passage. ...

An evolutionary scenario based on a theory for the coupling of the envelope shear with a constant turbulent viscosity (Zahn 1989) would require an initial semi-major axis of about 1 pc and an even higher eccentricity. Such a large separation between the components would make the survival of the system very unlikely. Goldman & Mazeh (1994) favored a quadratic reduction of the convective-envelope viscosity over time

References

- Duquennoy, A., Mayor, M., Andersen, J., Carquillat, J. M., & North, P. 1992, A&A, 254, L13
Goldman, I. & Mazeh, T. 1994, ApJ, 429, 362
Zahn, J.-P. 1989, A&A, 220, 112

- **Exercise 4b (L^AT_EX, ADS, emacs)**

Move to your directory `/home/username/latex/`

Copy from the course website file `H2bkesken.tex`

Copy it as a new file `cp H2bkesken.tex H4bvalmis.tex`

Remove from the file `H4bvalmis.tex` all text between commands `\begin{document}` and `\end{document}`

Find from the **ADS** database following formulas

Jetsu (1996, A&A 314, 153: Eq. 5)

Jetsu & Pelt (1996, A&AS 118, 587: Eq. 9)

Jetsu & Pelt (1999, A&AS 139, 629: Eq. 13)

Write them in the file `H4bvalmis.tex`.

Confine these formulas with following symbols `$$`.

Write only the formulas. You don't have to enumerate the formulas. You don't have to write any text located above or below of the source formulas in the file `H4bvalmis.tex`. The sizes, marginals, places of the summing indexes etc. do not have to be exactly the same as in the examples. It is enough that the mathematical meaning is the same.

Check the result with the commands

```
pdflatex H4bvalmis
```

```
evince H4bvalmis.pdf &
```

Edit in the same file `H4bvalmis.tex` the text and formulas written in blue below. The formulas of the two first rows are confined with symbols `$` which means they are in "in line" form. The last centralized formula is confined with symbols `$$` which means it is in "display math" form.

The connection between angles α , β and γ is $\alpha + \beta + \gamma = 180^\circ$

In some cases $\int_0^\infty T^4 f(x) dx = 17\Delta T$, but usually not.

However nicest is to write the formula

$$\epsilon = \frac{\sum_{i=1}^n \cos 2\pi\phi_i}{\sum_{i=1}^n \sin 2\pi\phi_i},$$

because it is in "display math" form i.e. confined by two `$$` symbols.

Check the result with commands

```
pdflatex H4bvalmis
```

```
evince H4bvalmis.pdf &
```

Finally edit in the same file `H4bvalmis.tex` the text and formulas written in blue below. The goal is to learn the use of the commands `\begin{eqnarray}` and `\end{eqnarray}`. Find out which **L^AT_EX** command prevents the enumeration of the two last formulas in case of `{eqnarray}`.

On top of that we shall rehearse the usage of the command `\verb`. I.g. text `\begin{eqnarray}` is created with the command

```
\verb|\begin{eqnarray}|
```

Let's learn how to use commands `\begin{eqnarray}` and `\end{eqnarray}` by creating following equation

$$\begin{aligned} a &= \int_c^d f(x) dx & (1) \\ \int_c^d f(x) dx &= \sum_i^n x_i \\ x^2 + y^2 + z^2 &= d, \end{aligned}$$

in which only the first of the formulas is enumerated and it is given the label `\label{omakaavani}`. With the command `\ref{omakaavani}` I'm creating the last number "1" of the last sentence right after the word "Equation". Now I'm finally referring to the Equation 1.

Check the result using command

```
pdflatex H4bvalmis
evince H4bvalmis.pdf &
```

Below is given a model how the file should `H4bvalmis.pdf` should look.

Jetsu (1996, A&A 314, 153: Eq. 5) in the right form

Jetsu & Pelt (1996, A&AS 118, 587: Eq. 9) in the right form

Jetsu & Pelt (1999, A&AS 139, 629: Eq. 13) in the right form

The connection between angles α , β and γ is $\alpha + \beta + \gamma = 180^\circ$

In some cases $\int_0^\infty T^4 f(x) dx = 17\Delta T$, but usually not.

However nicest is to write the formula

$$\epsilon = \frac{\sum_{i=1}^n \cos 2\pi\phi_i}{\sum_{i=1}^n \sin 2\pi\phi_i},$$

because it is in “display math” form i.e. confined by two $\$$ symbols.

Let’s learn how to use commands `\begin{eqnarray}` and `\end{eqnarray}` by creating following equation

$$\begin{aligned} a &= \int_c^d f(x) dx && (1) \\ \int_c^d f(x) dx &= \sum_i^n x_i \\ x^2 + y^2 + z^2 &= d, \end{aligned}$$

in which only the first of the formulas is enumerated and it is given the label `\label{omakaavani}`. With the command `\ref{omakaavani}` I’m creating the last number “1” of the last sentence right after the word “Equation”. Now I’m finally referring to the Equation 1.

Turning in the exercises

Send your assistant following files attached to the e-mail:

H4a: `H4avalmis.tex`, `H4aviitteet.bib` and `H4avalmis.ps`

H4b: `H4bvalmis.tex` and `H4bvalmis.pdf`