Ipkiss3.1.2 Installation Instructions

Updated on 19/10/2017 by Yang Liu. Updates are highlighted in red.

## This software is licensed for CUDOS and IPOS users only

Please contact Alvaro Casas Bedoya or Blair Morrison if you have any questions ([casas@physics.usyd.edu.au](mailto:casas@physics.usyd.edu.au), [blair.morrison@sydney.edu.au](mailto:blair.morrison@sydney.edu.au))

## Initial Configuration

The files for Ipkiss are found in the Cudos network folder “suphys2:\cudos\ipkiss\ipkiss3\Current Files”.

Contact Alvaro to get the latest licence. **Please read all the steps carefully**.

### Windows Local Machine

Start by installing the Ipkiss flow framework on the local windows machine

1. Uninstall any previous versions of Ipkiss on the local machine
2. **Copy (*do not modify these files*)** the “Current Files” folder from the network drive to your windows desktop. Run the “Ipkiss flow installer”, the installation can take quite long (10-15 minutes) just wait and don't turn off your machine.
3. Copy the license file (“.lic” extension) and paste it in C:\luceda\ipkiss\_312\python\envs\ipkiss3
4. Run the Luceda Control Center to find up to date documentation, samples etc. The documentation seems to have an issue if using Internet Explorer, please use **chrome or firefox** as the default browser.

### Installing a Python IDE

Ipkiss is based on Python scripts and thus requires a python editor to run. There are a number of good editors available and they need to be configured correctly to run Ipkiss, here I will provide a brief description of how to use pycharm to run Ipkiss scripts. Please look at the documentation in the Luceda Control Center for detailed descriptions for a general IDE, or the online link (**not up to date!**) <http://docs.lucedaphotonics.com/3.0.1/index.html>

1. Download the latest PyCharm community edition <https://www.jetbrains.com/pycharm/download>
2. Close the Luceda Control Centre if it is running. Run Pycharm the first time. At the welcome screen click the “Configure” button at the bottom (click **the cog**)
3. To change the Interpreter to the IpKiss312 interpreter**:** Default Project: -> Project Interpreter. In the dropdown change Interpreter to C:\luceda\ipkiss\_312\python\envs\ipkiss3\python.exe (you may need to add manually using the “Add local” option after clicking the cog). Click Background*if* a popup menu appears. The first run will be slow as PyCharm Indexes the various files and scripts.
4. Now add the scripts to the interpreter path: On the same screen as above, **Click the cog** next to the interpreter path and then click “more”
5. **Single click** the LucedaPhotonics python interpreter. Click the bottom icon on the right (three orange folders connected). Click the plus to add the scripts folder (C:\luceda\ipkiss\_312\python\envs\ipkiss3\Scripts). The path should be added, Click the refresh arrows on the right and you should see the path added on the bottom of the list.
6. Now click the “Build, Execution and Development tab” on the left of the settings menu. Click the console and change the python interpreter to the ipkiss interpreter as above.
7. Now that the software is almost configured you can create a Project. Click the create a project button, name your project and change the location to somewhere on **your local machine** (*for example*, C:\users\documents folder).
8. The IDE should now be ready. Follow the steps below to check the installation with the example. Changing the theme may make the IDE easier to read, you can try File -> Settings -> Appearance & Behaviour -> Appearance, click “Theme” “Darcula”.

*The followings are used for Hybrid chip design:*

Install ipkiss technology: In order to use the ASP PDK, you need to add the folder ipkiss to your PYTHONPATH environment variable. Three alternatives as below:

In Linux this can be done as:

**export PYTHONPATH=$PYTHONPATH:/path\_to\_asp\_pdk/ipkiss``**

Add **‘asp\_silicon\_photonics’ i**n the folder **C:\luceda\ipkiss\_312\python\envs\ipkiss3\Lib\site-packages. (recommended)**

You can also add the path to the PDK directly to sys.path list in your python scripts or notebooks as below:

**import sys**

**sys.path.append('C:\asp\_silicon\_photonics\ipkiss') # Change this to the location of the PDK**

### Installing a GDS viewer

Ipkiss outputs masks in the GDSII standard format. Download the latest version of KLayout (<http://www.klayout.de/build.html>) to view any GDS files created using Ipkiss.

*The followings are used for Hybrid chip design:*

**Install KLayout technology:**

Copy folder klayout/tech/cudos into your KLayout configuration folder:

* On Linux, it is $HOME/.klayout/tech
* On Windows, it is C:/Users/YOURUSERNAME/KLayout/tech

Start KLayout, on the toobar technology icon (icon with big letter T), select "Silicon Chalcogenide Hybrid" then press on the big T icon to apply the technology. Open a hybrid Silicon-Chalcogenide GDS file you should see that all layers are properly named.

On the Menu bar, you should see "CUDOS" menu. Under "CUDOS" menu, you should see two menu items: "Design rule check" to run DRC on silicon layers and "Finalize layers" to combine layers together ready for EBL writing.

### Testing Installation

To test the installation (license file and pycharm path configuration etc), run the example files provided in the “examples” folder, as explained below

1. Copy the example files into your PyCharm project folder on **your local machine**.
2. Open PyCharm. Click the dropdown of your project on the left and double click the execute.py file to open it.
3. You need to modify the environmental variables for Ipkiss to run properly. Click Run -> Edit Configurations. Click the “…” button next to the Environmental variables box (3rd from top). Click the plus and then on the left add the word “PATH” and on the right paste the line “C:\lucedaphotonics\python\envs\ipkiss3\Scripts;${PATH}”. Click OK at the bottom, Click the “Share” box at the top so the path is used for new files. Repeat the above steps for the “Defaults-> Python” on the left. Then click apply and ok to save your new settings. If you are having **issues running CAPHE** please check this step.
4. Run the file by right clicking the screen and selecting “Run Example” near the bottom. After this clicking the green play button at the top right should also work.
5. The python console should now appear, with the first line displaying “Obtained license for ipkiss.” A popup displaying an image of a circular ring with a waveguide coupler will be seen, close the popup at the top right.
6. A GDSII file of the ring is generated, which can be double clicked on in PyCharm on the left in the project folder. Click the bottom option if it is a first time popup, the GDSII should now open automatically in Klayout.
7. If this all occurred your Installation should be working! If any of the above does not happen please check your settings (**especially line 3 above**) and then contact Blair or Alvaro.
8. Now begin by working through the tutorials in the Luceda documentation, it is advisable to start with **getting started** “Quickstart: A first circuit” to familiarise yourself with all of Ipkiss and then commence the layout based **Tutorial**  “Simple Layout” or “First Simple Layout” before getting further technology files etc.
9. Its also useful to notice the ability of pycharm to auto complete using tab. As you perform the tutorials **(type the code yourself**, don't copy paste) you will see the auto completion blocks come up, and then you can select with the keyboard and tab to auto complete. This allows you to understand how the python classes are layered and are an indicator of the style for when you design your own building blocks.

## Next Steps (after some tutorials)

### Technology files for designing structures

Now that the installation is working it is advisable to work through the various example files and tutorials found in the Ipkiss documentation (available through the Luceda control center, the web link above may not match the installed version). For specific designs for submissions to different **foundries** the user requires technology files (for example from Imec for silicon photonics, or RMIT for possible chalcogenide mask designs) for correct waveguide definitions, building blocks, routing etc. These are available through Alvaro who will organise space on masks for the various multi wafer runs. Please contact Alvaro through the email provided.

### Meep Simulations

Using Ipkiss it is possible to perform Meep simulations on the designed structures. For Meep to be used the python code needs to be run on a linux machine. There is a version of Ipkiss installed on the schools machines which should be capable of doing this, however the exact configuration is a bit tricky and is still being worked through. Contact Blair for immediate inquiries otherwise this document will be updated once a smooth workflow is well defined. Be aware that we normally only only have four licenses and FDTD simulations may use a single license for long periods of time.