

# My(!) 1<sup>st</sup> DarkSUSY program

## • Solution (problem 1)

### 1. Create Fortran file:

```
program myprogram
implicit none

real*8 oh2,xf
integer unphys,war,ierr,iwar,nfc
real*8 dsrdomega

call dsinit
call dsgivemodel_silveira_zee(0.3d0,1000.d0) ! lambda = 0.3, mdm = 1000
call dsmodelsetup(unphys,war)
oh2=dsrdomega(1,1,xf,ierr,iwar,nfc)
write(*,*) 'Relic density, omega h^2 = ',oh2

end
```

### 2. Add following block to makefile (copy&paste just replace names):

```
ScalarSinglet_example: DS_MODULE = silveira_zee
ScalarSinglet_example: INC_MODULE = $(INC_SILVEIRAZEE)
ScalarSinglet_example: ScalarSinglet_example.f
ScalarSinglet_example: $(LIB)/libds_core.a $(LIB)/libds_core_user.a
$(ADD_SCR) libds_tmp.a $(LIB)/libds_$(DS_MODULE)_user.a $(LIB)/libds_core_user.a
$(LIB)/libds_$(DS_MODULE).a $(LIB)/libds_core.a
$(FF) $(FOPT) $(INC) $(INC_MODULE) -L$(LIB) -o ScalarSinglet_example
ScalarSinglet_example.f \
libds_tmp.a
rm -f libds_tmp.a
```

**Make sure to not  
convert <TAB>s  
to <SPACE>s  
without noticing!**



### 3. You also need to define (at the beginning)

```
INC_SILVEIRAZEE=-I$(DS_INSTALL)/src_models/silveira_zee/include
```

**TASK: DISCUSS (or try...) — what do you have to change to do the same for the generic\_WIMP model?**

# Using a replaceable function (3)

## • Solution (**problem II**)

1. Copy [DS]/src\_models/silveira\_zee/an/dsanwx.f to [my local directory]/my\_replaceables, and add the following lines at the end:

```
c...TB here we add the additional factor required in the tutorial
  s = 4.*(dsmwimp()**2 + p**2) ! Ecm**2
  dsanwx = dsanwx*s/dsmwimp()**2/4.d0
c
  write(*,*) 'replaceable test'

  return
end
```

2. Add following block to makefile (copy&paste, **changes** as indicated)

```
ScalarSinglet_mod DS_MODULE = silveira_zee
ScalarSinglet_mod INC_MODULE = $(INC_SILVEIRA_ZEE)
ScalarSinglet_mod ScalarSinglet_example.my_replaceables/dsanwx.f
ScalarSinglet_mod $(LIB)/libds_core.a $(LIB)/libds_core_user.a
$(ADD_SCR) libds_tmp.a $(LIB)/libds_$(DS_MODULE)_user.a $(LIB)/libds_$(DS_MODULE).a $(LIB)/libds_core.a
$(FF) $(FOPT) $(INC) $(INC_MODULE) -L$(LIB) -o ScalarSinglet_example ScalarSinglet_example.f
my_replaceables/dsanwx.f
libds_tmp.a
rm -f libds_tmp.a
```

**Using 'dsanwx.f' → '\*.f' allows you to replace many functions at the same time (and switch such changes on/off simply by dragging them into/out of your my\_replaceables/ folder !)**

