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        ! modules and global parameters
    1
        include 'mod kind types.f90'
    2
        include 'mod constants and parameters.f90'
    3
        include 'mod linear regression.f90'
    4
        include 'mod quality measures.f90'
    5
        include 'mod surface fit.f90'
    6
        include 'mod timer.f90'
    7
        include 'mod plasma.f90'
    8
        include 'mod Helios output.f90'
    9
        include 'mod compiler.f90'
   10
        include 'mod Helios.f90'
   11
        include 'mod system info.f90'
   12
        include 'mod input parameters.f90'
   13
   14
        program main
   15
   16
        use system info mod
   17
        use plasma
   18
        use compiler
   19
        use cpu_timer_class
   20
        use clock timer class
   21
        use HELIOS data
   22
        use input parameters
   23
        implicit none
   24
   25
                                        :: HeB emmissivity ! instantiate dla
        type ( HELIOS )
   26
        type ( HELIOS )
                                        :: LyB_emmissivity ! instantiate dla
   27
                                        :: HeB_opacity ! instantiate dla
        type ( HELIOS )
   28
        type ( HELIOS )
                                        :: LyB_opacity ! instantiate dla
   29
   30
                                                             ! line of sight
        type ( thermo )
                                         :: DT
   31
   32
        type ( system_info )
                                                             ! system level in
   33
                                        :: job
   34
                                                            ! domain and toy
        type ( input_deck )
   35
                                        :: parameters
   36
        type ( cpu_timer )
                                        :: cpu_self ! instantiate <PU</pre>
    37
```

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                                                        ! instantiate clo
        type ( clock_timer )
                                       :: clock self
   38
        type ( cpu_timer )
                                       :: cpu poly
                                                          ! instantiate <code>@PU</code>
   39
                                       :: clock_poly ! instantiate dlo
        type ( clock_timer )
   40
                                       :: cpu_numr
        type ( cpu_timer )
                                                          ! instantiate ₫PU
   41
        type ( clock timer )
                                      :: clock numr
                                                         ! instantiate dlo
   42
        real ( dp )
                                       :: cpu time = zero
   43
                                       :: clock time = zero
        real ( dp )
   44
        real ( dp )
                                       :: amps ( 1 : t )
   45
        real ( dp )
                                       :: fcn, x
   46
        real ( dp )
                                       47
                                       :: k, temps, dens, many
        integer ( lint )
   48
   49
        character ( len = 30 ) :: timestamp
   50
        character ( len = 64 )
                                      :: dir working
   51
   52
   53
   54 | !
        interface
   55
   56
         function Taylor_polynomial_otro_fcn ( x, y, a ) result ( f )
   57
            use constants and parameters
   58
            implicit none
   59
            real ( wp ), intent ( in ) :: x, y
   60
            real ( wp ), intent ( in ) :: a ( 1 : t )
   61
            real (wp)
   62
          end function Taylor polynomial otro fcn
   63
   64
        end interface
   65
     !
   66
   67
   68
   69
        ! start timers
   70
        call cpu_self % cpu_timer_grab
   71
        call clock self % clock start timer ( )
   72
   73
        call load_data ( HeB_emmissivity, LyB_emmissivity, HeB_opacity, LyB_
   74
```

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   75
   76
        ! stop the CPU timer
       cpu time = cpu self % cpu timer stop
   77
       clock_time = clock_self % clock_elapsed_time ( )
   78
   79
        print *
   80
       call how_long_sub ( io_unit_default, cpu_time,  'elapsed CPU time f
   81
       call how long sub ( io unit default, clock time, 'elapsed clock time
   82
   83
   84
   85
       call nml_reader ( parameters, dir working )
   86
       print *, parameters % num_intervals, parameters % domain_a, paramet
   87
   88
   89
        call DT % create mesh ( parameters % num intervals, parameters % dom
   90
   91
   92
       call DT % populate_pressure ( parameters % pressure_xi, parameter
   93
        print *, 'DT % pressure_list = ', DT % pressure_list
   94
   95
       96
        print *, 'DT % density_list = ', DT % density_list
   97
   98
       call DT % populate_temperature ( )
                                                    ! E0S
   99
       print *, 'DT % temperature list = ', DT % temperature list
  100
  101
  102
  103
        ! closing statements
  104
  105
        print *
  106
       print *, 'Fortran compiler version : ', compiled by
  107
       print *, 'Fortran compiler options : ', compiled_with
  108
  109
       write ( *, * ) timestamp ( )
  110
  111
```

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112 113	end program main
114 115	! assortment of utility routines
	include 'sub routines.f90'