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# $Header$

Cactus::cctk_run_title      = "Meudon data"
Cactus::cctk_full_warnings = yes
Cactus::cctk_timer_output  = full

#Cactus::terminate        = immediately
Cactus::terminate         = never
#Cactus::terminate        = time
#Cactus::cctk_final_time  = 1.0
#Cactus::terminate        = iteration
#Cactus::cctk_itlast      = 524288

ActiveThorns = "LocalInterp AEILocalInterp"

#ActiveThorns = "NaNCatcher"

ActiveThorns = "Slab"

ActiveThorns = "TGRtensor"

ActiveThorns = "SphericalSurface"

SphericalSurface::nsurfaces = 4
SphericalSurface::maxntheta = 39
SphericalSurface::maxnphi  = 76

SphericalSurface::ntheta[0] = 39
SphericalSurface::nphi[0]   = 76
SphericalSurface::nghoststtheta[0] = 2
SphericalSurface::nghostsphi[0] = 2

SphericalSurface::ntheta[1] = 39
SphericalSurface::nphi[1]   = 76
SphericalSurface::nghoststtheta[1] = 2
SphericalSurface::nghostsphi[1] = 2

SphericalSurface::ntheta[2] = 39
SphericalSurface::nphi[2]   = 76
SphericalSurface::nghoststtheta[2] = 2
SphericalSurface::nghostsphi[2] = 2

SphericalSurface::ntheta[3] = 39
SphericalSurface::nphi[3]   = 76
SphericalSurface::nghoststtheta[3] = 2
SphericalSurface::nghostsphi[3] = 2

ActiveThorns = "IOUtil"

IO::out_dir = $parfile

ActiveThorns = "Carpet CarpetLib CarpetInterp CarpetReduce CarpetSlab"

Carpet::domain_from_coordbase = yes

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Carpet::max_refinement_levels = 20

driver::ghost_size = 2
Carpet::buffer_width = 4

Carpet::prolongation_order_space = 3
Carpet::prolongation_order_time = 2

Carpet::convergence_level = 0

Carpet::init_3_timelevels = yes

CarpetLib::save_memory_during_regridding = yes

ActiveThorns = "Boundary CartGrid3D CoordBase ReflectionSymmetry RotatingSymmetry180 SymBase"

CoordBase::domainsize = minmax

CoordBase::xmin = 0.0
CoordBase::ymin = -48.0
CoordBase::zmin = 0.0
CoordBase::xmax = 48.0
CoordBase::ymax = 48.0
CoordBase::zmax = 48.0
CoordBase::dx = 1.6
CoordBase::dy = 1.6
CoordBase::dz = 1.6

CoordBase::boundary_size_x_lower = 2
CoordBase::boundary_size_z_lower = 2
CoordBase::boundary_shiftout_x_lower = 1
CoordBase::boundary_shiftout_z_lower = 1

CartGrid3D::type = coordbase
CartGrid3D::avoid_origin = no

ReflectionSymmetry::reflection_z = yes
ReflectionSymmetry::avoid_origin_z = no

ActiveThorns = "CarpetRegrid"

CarpetRegrid::refinement_levels = 5
CarpetRegrid::smart_outer_boundaries = yes

CarpetRegrid::keep_same_grid_structure = yes
CarpetRegrid::refined_regions = manual-coordinate-list
CarpetRegrid::coordinates = "
    [ [ [-00.0,-24.0,-0.0]:[+33.6,+24.0,+24.0]:[0.8,0.8,0.8] ],
      [ [-00.0,-12.0,-0.0]:[+21.6,+12.0,+12.0]:[0.4,0.4,0.4] ],
      [ [-00.0,-06.0,-0.0]:[+15.4,+06.0,+06.0]:[0.2,0.2,0.2] ],
      [ [+06.0,-03.0,-0.0]:[+12.4,+03.0,+03.0]:[0.1,0.1,0.1] ] ]
"

ActiveThorns = "NaNChecker"

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NaNChecker::check_every = 524288
NaNChecker::action_if_found = terminate
NaNChecker::check_vars = "
    ADM_BSSN::ADM_BSSN_phi
    ADM_BSSN::ADM_BSSN_metric
    ADM_BSSN::ADM_BSSN_curv
    ADM_BSSN::ADM_BSSN_K
    ADM_BSSN::ADM_BSSN_gamma
    ADMBase::lapse
    ADMBase::shift
"

ActiveThorns = "ADMBase ADMCoupling ADMMacros CoordGauge SpaceMask StaticConformal TmunuBase"

ADMMacros::spatial_order = 4

## SpaceMask::use_mask = yes

## ActiveThorns = "LegoExcision"
##
## LegoExcision::fixed_excision = sphere
## LegoExcision::num_fixed_regions = 2
##
## LegoExcision::fixed_size = 0.801
## LegoExcision::fixed_origin_x = 9.0
## LegoExcision::fixed_origin_y = 0.0
## LegoExcision::fixed_origin_z = 0.0
##
## LegoExcision::fixed2_size = 0.801
## LegoExcision::fixed2_origin_x = -9.0
## LegoExcision::fixed2_origin_y = 0.0
## LegoExcision::fixed2_origin_z = 0.0

ActiveThorns = "NoExcision"

NoExcision::num_regions = 2

NoExcision::centre_x [0] = 9.0
NoExcision::centre_y [0] = 0.0
NoExcision::centre_z [0] = 0.0
NoExcision::radius [0] = 0.501 # 0.251
NoExcision::overwrite_lapse [0] = no
NoExcision::smoothing_zone_width[0] = 0.25

NoExcision::centre_x [1] = -9.0
NoExcision::centre_y [1] = 0.0
NoExcision::centre_z [1] = 0.0
NoExcision::radius [1] = 0.501 # 0.251
NoExcision::overwrite_lapse [1] = no
NoExcision::smoothing_zone_width[1] = 0.25

ActiveThorns = "MeudonData"

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ADMBase::initial_data = "meudon"
ADMBase::initial_lapse = "meudon-averaged"
ADMBase::initial_shift = "meudon"

MeudonData::meud_data_file = "spec21_18.d"
MeudonData::meud_do = nothing
MeudonData::meud_fill_holes = iso
MeudonData::meud_x1 = 9.0
MeudonData::meud_all_storage = on
MeudonData::me_interpolator = spectral

ActiveThorns = "Time"

Time::dtfac = 0.25

ActiveThorns = "MoL"

MoL::ODE_Method = RK3

ActiveThorns = "BSSN_MoL"

## BSSN_MoL::excise = yes
## BSSN_MoL::excisionType = lego

ADMBase::evolution_method = ADM_BSSN

ADM_BSSN::stencil_size = 2
ADM_BSSN::advection = upwind2
ADM_BSSN::bound = newrad

ADMBase::lapse_evolution_method = 1+log
ADM_BSSN::lapsesource = modified
ADM_BSSN::harmonic_f = 2.0
ADM_BSSN::LapsePsiPower = 4
ADM_BSSN::force_lapse_positive = yes

ADMBase::shift_evolution_method = gamma0
ADM_BSSN::ShiftGammaCoeff = 0.75
ADM_BSSN::BetaDriver = 2.5
ADM_BSSN::ShiftAlpPower = 2
ADM_BSSN::ShiftPsiPower = 4

ActiveThorns = "DriftCorrect4"

DriftCorrect4::verbose = yes
DriftCorrect4::nsources = 1

DriftCorrect4::position_x[0] = 9.0
DriftCorrect4::position_y[0] = 0.0
DriftCorrect4::surface_index[0] = 0
DriftCorrect4::first_driftcorrect_iteration[0] = 524288
DriftCorrect4::driftcorrect_every[0] = 524288
DriftCorrect4::do_azimuthal_correction[0] = yes
DriftCorrect4::azimuthal_timescale[0] = 5.0

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DriftCorrect4::do_radial_correction[0]      = yes
DriftCorrect4::radial_timescale[0]         = 5.0

ActiveThorns = "Dissipation"

Dissipation::vars = "
ADM_BSSN::ADM_BSSN_phi
ADM_BSSN::ADM_BSSN_metric
ADM_BSSN::ADM_BSSN_curv
ADM_BSSN::ADM_BSSN_K
ADM_BSSN::ADM_BSSN_gamma
ADMBase::lapse
ADMBase::shift
"

ActiveThorns = "ADMAnalysis"

ActiveThorns = "ADMConstraints"

## ADMConstraints::excise = yes

ActiveThorns = "AHFinderDirect"

AHFinderDirect::N_horizons      = 2 # 4
AHFinderDirect::find_every      = 524288
AHFinderDirect::max_Newton_iterations__initial = 50
AHFinderDirect::max_Newton_iterations__subsequent = 50

AHFinderDirect::geometry_interpolator_name = "Lagrange polynomial interpolation"
AHFinderDirect::geometry_interpolator_pars = "order=4"
AHFinderDirect::surface_interpolator_name = "Lagrange polynomial interpolation"
AHFinderDirect::surface_interpolator_pars = "order=4"

# individual AH
AHFinderDirect::origin_x      [1] = 9.0
AHFinderDirect::initial_guess__coord_sphere__x_center [1] = 9.0
AHFinderDirect::initial_guess__coord_sphere__radius [1] = 1.0
AHFinderDirect::reset_horizon_after_not_finding [1] = no
AHFinderDirect::which_surface_to_store_info [1] = 0

# common AH
AHFinderDirect::initial_guess__coord_sphere__radius [2] = 15.0
AHFinderDirect::max_allowable_horizon_radius [2] = 40.0
AHFinderDirect::reset_horizon_after_not_finding [2] = no
AHFinderDirect::which_surface_to_store_info [2] = 1

# pretracking
AHFinderDirect::initial_guess__coord_sphere__radius [3] = 15.0
AHFinderDirect::max_allowable_horizon_radius [3] = 40.0
AHFinderDirect::which_surface_to_store_info [3] = 2
AHFinderDirect::use_pretracking [3] = yes
AHFinderDirect::reset_horizon_after_not_finding [3] = no
AHFinderDirect::surface_modification [3] = "radius"
AHFinderDirect::pretracking_value [3] = 0.0

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AHFinderDirect::pretracking_minimum_value [3] = 0.00
AHFinderDirect::pretracking_maximum_value [3] = 5.0
AHFinderDirect::pretracking_delta [3] = 0.5
AHFinderDirect::pretracking_minimum_delta [3] = 0.0001
AHFinderDirect::pretracking_maximum_delta [3] = 0.5
AHFinderDirect::smoothing_factor [3] = 0.25

# common AH, starting from pretracking surface
AHFinderDirect::depends_on [4] = 3
AHFinderDirect::desired_value_factor [4] = 0.0
AHFinderDirect::max_allowable_horizon_radius [4] = 40.0
AHFinderDirect::which_surface_to_store_info [4] = 3

ActiveThorns = "IsolatedHorizon"

IsolatedHorizon::verbose      = yes
IsolatedHorizon::num_horizons = 4
IsolatedHorizon::surface_index[0] = 0
IsolatedHorizon::surface_index[1] = 1
IsolatedHorizon::surface_index[2] = 2
IsolatedHorizon::surface_index[3] = 3

ActiveThorns = "IOBasic"

IOBasic::outInfo_every      = 1
IOBasic::outInfo_reductions = "norm2"
IOBasic::outInfo_vars      = "
ADMConstraints::ham
ADMConstraints::momx
IsolatedHorizon::ih_spin[0]
IsolatedHorizon::ih_radius[0]
IsolatedHorizon::ih_mass[0]
"

ActiveThorns = "CarpetIOScalar"

IOScalar::outScalar_every = 1
IOScalar::outScalar_vars = "
grid::coordinates
SpaceMask::emask
ADM_BSSN::ADM_BSSN_phi
ADM_BSSN::ADM_BSSN_metric
ADM_BSSN::ADM_BSSN_K
ADM_BSSN::ADM_BSSN_curv
ADM_BSSN::ADM_BSSN_gamma
ADMBase::metric
ADMBase::curv
ADMBase::lapse
ADMBase::shift
ADMAnalysis::trK
ADMAnalysis::Ricci
ADMConstraints::hamiltonian
ADMConstraints::normalized_hamiltonian
ADMConstraints::momentum
SphericalSurface::sf_radius
IsolatedHorizon::ih_shapes

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IsolatedHorizon::ih_coordinates
IsolatedHorizon::ih_tetrad_l
IsolatedHorizon::ih_tetrad_n
IsolatedHorizon::ih_tetrad_m
IsolatedHorizon::ih_newman_penrose
IsolatedHorizon::ih_expansions
IsolatedHorizon::ih_weyl_scalars
IsolatedHorizon::ih_ricci_scalars
IsolatedHorizon::ih_twometric
IsolatedHorizon::ih_killing_vector
IsolatedHorizon::ih_killed_twometric
IsolatedHorizon::ih_invariant_coordinates
IsolatedHorizon::ih_3determinant
IsolatedHorizon::ih_fluxes

```

"

ActiveThorns = "CarpetIOASCII"

```

IOASCII::out0D_every = 1
IOASCII::out0D_vars = "
  grid::coordinates
  SpaceMask::emask
  ADM_BSSN::ADM_BSSN_phi
  ADM_BSSN::ADM_BSSN_metric
  ADM_BSSN::ADM_BSSN_K
  ADM_BSSN::ADM_BSSN_curv
  ADM_BSSN::ADM_BSSN_gamma
  ADMBase::metric
  ADMBase::curv
  ADMBase::lapse
  ADMBase::shift
  ADMAnalysis::trK
  ADMAnalysis::Ricci
  ADMConstraints::hamiltonian
  ADMConstraints::normalized_hamiltonian
  ADMConstraints::momentum
  SphericalSurface::sf_valid
  SphericalSurface::sf_info
  SphericalSurface::sf_radius
  SphericalSurface::sf_origin
  SphericalSurface::sf_coordinate_descriptors
  DriftCorrect4::dc4_state
  DriftCorrect4::dc4_current_time
  DriftCorrect4::dc4_omega
  DriftCorrect4::dc4_radius
  IsolatedHorizon::ih_state
  IsolatedHorizon::ih_grid_int
  IsolatedHorizon::ih_grid_real
  IsolatedHorizon::ih_shapes
  IsolatedHorizon::ih_coordinates
  IsolatedHorizon::ih_tetrad_l
  IsolatedHorizon::ih_tetrad_n
  IsolatedHorizon::ih_tetrad_m
  IsolatedHorizon::ih_newman_penrose
  IsolatedHorizon::ih_expansions
  IsolatedHorizon::ih_weyl_scalars
  IsolatedHorizon::ih_ricci_scalars
  IsolatedHorizon::ih_twometric
  IsolatedHorizon::ih_killing_vector
  IsolatedHorizon::ih_killed_twometric

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IsolatedHorizon::ih_scalars
IsolatedHorizon::ih_invariant_coordinates
IsolatedHorizon::ih_multipole_moments
IsolatedHorizon::ih_3determinant
IsolatedHorizon::ih_fluxes

```

"

```

IO::out_yline_x = 9.0
IO::out_zline_x = 9.0
IOASCII::out1D_every = 1
IOASCII::out1D_vars = "
  grid::coordinates
  SpaceMask::emask
  ADM_BSSN::ADM_BSSN_phi
  ADM_BSSN::ADM_BSSN_metric
  ADM_BSSN::ADM_BSSN_K
  ADM_BSSN::ADM_BSSN_curv
  ADM_BSSN::ADM_BSSN_gamma
  ADMBase::metric
  ADMBase::curv
  ADMBase::lapse
  ADMBase::shift
  ADMAnalysis::trK
  ADMAnalysis::Ricci
  ADMConstraints::hamiltonian
  ADMConstraints::normalized_hamiltonian
  ADMConstraints::momentum
  SphericalSurface::sf_radius
  IsolatedHorizon::ih_shapes
  IsolatedHorizon::ih_coordinates
  IsolatedHorizon::ih_tetrad_l
  IsolatedHorizon::ih_tetrad_n
  IsolatedHorizon::ih_tetrad_m
  IsolatedHorizon::ih_newman_penrose
  IsolatedHorizon::ih_expansions
  IsolatedHorizon::ih_weyl_scalars
  IsolatedHorizon::ih_ricci_scalars
  IsolatedHorizon::ih_twometric
  IsolatedHorizon::ih_killing_vector
  IsolatedHorizon::ih_killed_twometric
  IsolatedHorizon::ih_invariant_coordinates
  IsolatedHorizon::ih_3determinant
  IsolatedHorizon::ih_fluxes

```

"

```

IO::out_yzplane_x = 9.0
IOASCII::out2D_criterion = time
IOASCII::out2D_dt = 0.8
IOASCII::out2D_vars = "
  SphericalSurface::sf_radius
  IsolatedHorizon::ih_shapes
  IsolatedHorizon::ih_coordinates
  IsolatedHorizon::ih_tetrad_l
  IsolatedHorizon::ih_tetrad_n
  IsolatedHorizon::ih_tetrad_m
  IsolatedHorizon::ih_newman_penrose
  IsolatedHorizon::ih_expansions
  IsolatedHorizon::ih_weyl_scalars
  IsolatedHorizon::ih_ricci_scalars
  IsolatedHorizon::ih_twometric
  IsolatedHorizon::ih_killing_vector
  IsolatedHorizon::ih_killed_twometric

```

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```
IsolatedHorizon::ih_invariant_coordinates
IsolatedHorizon::ih_3determinant
IsolatedHorizon::ih_fluxes
```

```
"
ActiveThorns = "CarpetIOHDF5"
```

```
IOHDF5::out3D_criterion = time
IOHDF5::out3D_dt       = 0.8
IOHDF5::out3D_vars     = "
  SpaceMask::emask
  ADM_BSSN::ADM_BSSN_phi
  ADM_BSSN::ADM_BSSN_metric
  ADM_BSSN::ADM_BSSN_K
  ADM_BSSN::ADM_BSSN_curv
  ADM_BSSN::ADM_BSSN_gamma
  ADMBase::metric
  ADMBase::curv
  ADMBase::lapse
  ADMBase::shift
  ADMAnalysis::Ricci
  ADMConstraints::hamiltonian
  ADMConstraints::normalized_hamiltonian
  ADMConstraints::momentum
"
```

```
IOHDF5::checkpoint = yes
IO::checkpoint_dir = $parfile
IO::checkpoint_every = 5242880
```

```
ActiveThorns = "TimerReport"
```

```
TimerReport::out_every = 524288
TimerReport::before_checkpoint = yes
```