# Connection, curvature, and package gravitation

Short name: **grv_en.pdf**

This article is rebuilt from Monograph 2.4. It begins with an abstract, a shared NAPRLK / NAPG 2.0 context note, and a local table of contents, followed by the extracted and verified core text.

## Abstract

This article joins the English curvature/connection block, the gravitation block, and the appendix on reper and package gravitation.

## Shared NAPRLK / NAPG 2.0 context

In NAPRLK / NAPG 2.0 gravitation is read as an observable descendant of a deeper package geometry. The reper is the operator that stabilizes local readability of reduced geometry.

## Article contents

Source: Monograph 2.4 EN, chapters 19–20 + appendix N

CHAPTER 19

# Connection, curvature, and the gravitational layer

## 1. Realized internal sectors

The compatibility assignment $C_{V*P}$ is required to produce on

the total support $L$ the following realized sectors: eginenumerate

a realized transport sector $T_{V*P}$;

a realized obstruction sector $O_{V*P}$;

a realized quadratic sector $Q_{V*P}$

generated by the internal image of $R\star R$;

a realized admissible quadratic sector $X^{(2)}_{V*P}$;

a realized defect-image sector $I^{(2)}_{V*P} \subseteq X^{(2)}_{V*P}$;

a realized projection $\Pi_{V*P} : T_{V*P} o O_{V*P}$.

For each

realized sector $E_{V*P}$ its module of admissible sections is denoted by $\Gamma_{V*P}(E_{V*P})$.

## 2. Admissible transport algebra

egindefinition[Admissible transport algebra] An admissible transport algebra for $V$ is a

quadruple $(D_{V*P}, [\cdot,\cdot]_{V*P}, \rho_{V*P}, D_{\mathrm{hor}} \oplus D_{\mathrm{ver}})$, where: egi- nenu- mer- ate

$D_{V*P}$ is a module of admissible transport directions on $L$;

$[\cdot,\cdot]_{V*P}\colon D_{V*P} imes D_{V*P} o D_{V*P}$ is a bilinear bracket;

$\rho_{V*P}\colon D_{V*P} o \mathrm{Der}_K(C_{V*P}(L))$ is an anchor action on admissible scalars;

$D_{V*P} = D_{\text{hor}} \oplus D_{\text{ver}}$ is a fixed decomposition into horizontal and vertical transport directions.

### 3. The $V*P$ connection package

egindefinition[$V*P$ connection package] A $V*P$ connection package

on a fundamental structure is a quadruple $\nabla_{V*P} = (\nabla_L, \nabla_T, \nabla_O, \nabla_\star)$, consisting of: egi- nenumerate

a connection on admissible transport directions $\nabla_L$: $D_{V*P} imes D_{V*P} o D_{V*P}$;

a connection on the realized transport

sector $\nabla_T \colon D_{V*P} imes \Gamma_{V*P}(T_{V*P}) o \Gamma_{V*P}(T_{V*P})$;

a connection on the realized obstruction sector $\nabla_O \colon D_{V*P} imes \Gamma_{V*P}(O_{V*P}) o \Gamma_{V*P}(O_{V*P})$;

a connection on the realized quadratic sector $\nabla_\star \colon D_{V*P} imes \Gamma_{V*P}(Q_{V*P}) o \Gamma_{V*P}(Q_{V*P})$. These maps are assumed to be $K$-bilinear, $C_{V*P}(L)$-linear in the transport

argument, and Leibniz-compatible in the field argument.
egindefinition[Geometrically admissible connection package]
A connection package $\nabla_{V*P}$ is called geometrically admissible if it satisfies:
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horizontal/vertical coherence;

projection compatibility $\Pi_{V*P}(\nabla^{T}_{X}u) = \nabla^{O}_{X}igl(\Pi_{V*P}(u)igr);$

defect retention;

quadratic-sector coherence, that is, the internal image of $R\star R$ survives as a genuine transported sector;

classical reducibility:

for each admissible classical section the package admits a reduced geometric descendant.

## 4. Torsion, curvature, and the source-coupling slot

egindefinition[Torsion of the package connection] The torsion of $\nabla_L$ is

the map $\Theta_{V*P}(X,Y) := \nabla^L_X Y - \nabla^L_Y X - [X,Y]_{V*P}$.

egindefinition[Curvature operators] The curvature operators of the $V*P$ package are egin*align* $\mathrm{R}^L_{V*P}(X,Y)Z = \nabla^L_X \nabla^L_Y Z - \nabla^L_Y \nabla^L_X Z - \nabla^L_{[X,Y]_{V*P}} Z,$ $\mathrm{R}^T_{V*P}(X,Y)u = \nabla^T_X \nabla^T_Y u - \nabla^T_Y \nabla^T_X u - \nabla^T_{[X,Y]_{V*P}} u,$ $\mathrm{R}^O_{V*P}(X,Y)\omega = \nabla^O_X \nabla^O_Y \omega - \nabla^O_Y \nabla^O_X \omega - \nabla^O_{[X,Y]_{V*P}} \omega,$ $\mathrm{R}^\star_{V*P}(X,Y)q = \nabla^\star_X \nabla^\star_Y q - \nabla^\star_Y \nabla^\star_X q - \nabla^\star_{[X,Y]_{V*P}} q.$

Together with $\Theta_{V*P}$ they form

the curvature package

$$K_{V*P} = (\Theta_{V*P}, R^{L}_{V*P}, R^{T}_{V*P}, R^{O}_{V*P}, R^{\star}_{V*P}).$$

egindefinition[Source-coupling slot] A source-coupling slot for $(V, \nabla_{V*P})$ is a formally designated place at which the intrinsic source-like sector $S_{\mathrm{src}}(V)$ may later enter the geometric or dynamical

theory through an admissible correction rule.

eginremark[Principled honesty] At the present stage the source-coupling slot is only a structural placeholder. It is not yet a field equation. In other words, the connection package and the

curvature package are already defined, but the final gravitational dynamics are not yet closed at the level of field equations.

## 5. Reduced geometric package along a classical section

Let

$s : UoL$

be an admissible classical section. Its reduced geometric package is the pullback $s^*(\nabla_{V*P}, K_{V*P})$, together with the induced descendant on the reduced classical datum $R_{\mathrm{cl}}(s)$.

eginremark This is the point at which

a bridge appears between pure package geometry and a future classical gravitational description. The bridge must not yet be mistaken for a final Einsteinian dynamics; it only specifies the

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CHAPTER 20

# Package gravitation: gravitational slope, classical reduction, and the path toward the Einstein-type regime

## 1. Gravitation as an observable descendant of package geometry

In the earlier phenomenological chapter the gravitational field was already read as an effective slope of the functional $D^*$ on

the outer, quasi-classical layer. This interpretation can now be sharpened: gravitation is not an independent isolated ingredient but an observable descendant of the reduced geometric package

along an admissible classical section. This means that the phenomenological "gravitational slope" and the geometric package $K_{V*P}$ belong to the same architecture while occupying different

reading levels. The former describes observed regimes of motion and stability; the latter describes the internal geometry from which such regimes may be obtained after controlled reduction.

## 2. Reinterpreting the gravitational slope

On the layer $k = 3$ the effective gradient $\nabla D_3^*$ defines the drift field $\vec{v}_{\text{drift}}^{(3)} = -\mu_3 \nabla D_3^*$. In this language free fall corresponds to the dominance of the normal component of

motion, the orbital regime to a compensation of descent by the tangential component and local layer geometry, and trapping to motion inside a local package funnel.

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be described phenomenologically through descent geometry, while the full gravitational meaning arises only after that slope is linked to the reduced geometric package $s^*(\nabla_{V*P}, K_{V*P})$.

## 3. The path toward classical Einstein-type reduction

From the viewpoint of the general program, controlled classical Einstein-type reduction is to be understood as the following sequence: egi- nenu- mer- ate

choose an admissible classical section $s \in \Sigma_{\mathrm{cl}}$;

obtain along it the reduced geometric package $s^*(\nabla_{V*P}, K_{V*P})$;

require that the reduced classical datum $R_{\mathrm{cl}}(s)$ carry a Lorentzian spacetime structure;

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package $(s^{*}\nabla_{V*P}, s^{*}K_{V*P}, S_{\mathrm{src}}(V))$ along an admissible classical section.

## 4. Reper, co-reper, and the grounding of package gravitation

In the physical layer of version 2.4 the reper ceases to be understood as an

external coordinate device. It becomes the admissible way of reading a classical section and the reduced package $s^*(abla_{V*P}, K_{V*P})$. If the classical section tells us *where* a geometric

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tied to the internal package curvature.

egindefinition[Gravitational reper] A gravitational reper for an admissible classical section $s : UoL$ is a system of local directions

ho$_s$ = $(e_0, e_1, e_2, e_3)$, defined on $R_{\mathrm{cl}}(s)$ and

compatible with the horizontal/vertical decomposition of the transport algebra, such that the observable gravitational regime is read as a descendant of $s^*(abla_{V*P}, K_{V*P})$.

egindefinition[Co-reper of gravitational

reading] The coreper of gravitational reading is the system dual to $ho_s$, namely $ho_s^* = (heta^0, heta^1, heta^2, heta^3)$, in which the connection package, the curvature package, and the drift field are written as locally observable forms

and co- ef- fi- cients. The co- reper does not re- place the ge- om- e- try; it trans- lates the re- duced pack- age into a form suit- able for phe- nomeno- log- i- cal and clas- si- cal read- ing. eginproposition[The role of the reper in pack- age

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general logic of the project is essential. In the logic of judgments, the trans-reper point $r$ closes a configuration and contributes new content. In the gravitational layer, the reper performs the conjugate task:

it does not merely label coordinates, but stabilizes the way in which the reduced geometric package becomes physically readable. The reper in package gravitation is therefore not a

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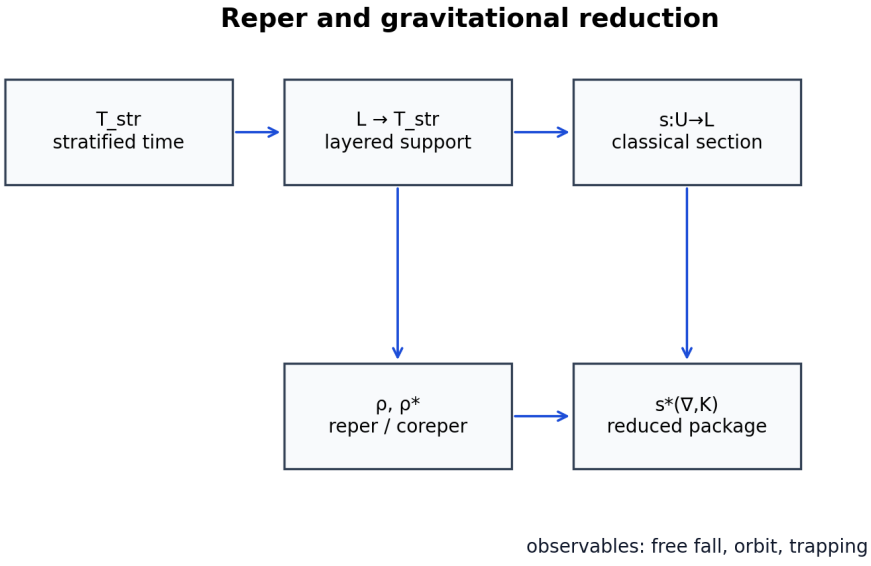


regime.

## 5. The source-like sector and the limits of interpretation

Within classical phenomenology one naturally expects that part of the gravitational content will be read as an effective source. Yet in

the logic of the present publication that source must not be prematurely identified with ordinary matter. It is more precise to say that the internal sector $S_{\mathrm{src}}(V)$ defines a candidate for

effective contributions which, in the next paper of the program, may generate classical right-hand sides of the reduced regime.
eginremark[The four prohibitions once again]
Thus the same four prohibitions remain

in force within the gravitational node: $R\star$ $R$ is not the energy–momentum tensor, the obstruction layer is not ordinary matter, the Hodge–Laplace bridge is not the full field law, and classical spacetime does not exhaust

the ontology of the theory.

### 6. Editorial honesty of the gravitational layer

The present unified publication fixes the assembled foundation and adds the gravitational layer, but it does not claim that

the field equations have thereby been fully derived. The correct formulation is the following:

- the fundamental $V*P$ structure has now been fixed;
- the package of connection and curvature has

been fixed;

- the path toward the Minkowski–Einstein section has been localized;
- the gravitational slope already has a phenomenological reading;
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that, along admissible classical sections, it produces a controlled Einstein-type reduction and, on the outer layer $k = 3$, reproduces the observed gravitational slope regime as a quasi-classical phenomenology.

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exhausted by a single classical metric. It is a reducible, stratified, and package-controlled regime connected with curvature, transport, the intrinsic source-like sector, and the observable geometry of

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APPENDIX N

# Appendix to the gravitational node: Reper and package gravitation

## 1. Why the reper is necessary

In package gravitation one

cannot stop with the bare reference to a section $s : UoL$. The section localizes the reduction, but does not determine how the reduced package is to be read. The reper is needed in order to translate

$s^*(abla_{V*P}, K_{V*P})$ into observable geometry: free fall, orbital regime, drift-compensation, and local gravitational funnels.

## 2. The reper as the local ground of observable geometry

In this framework the reper is a

local package of directions compatible with the admissible transport algebra. It must respect the splitting into horizontal and vertical regimes, preserve the connection package, and

admit a coreper reading of curvature and torsion. In other words, the reper is the operator that links internal package curvature to the outer phenomenology of the gravitational slope.

### 3. The trans-reper analogy

The logic of judgment and the gravitational layer are isomorphic in their movement. In the logical part, the trans-reper point $r$ closes the harmonic quadruple and makes possible a

synthetic increment of sense. In the gravitational node, the reper closes the phenomenological reading of the reduced package and makes possible the transition from internal geometry to

observable dynamics. Reper and transreper therefore form a linked packet: one works at the level of local readability of geometry, the other at the level of projective-harmonic closure of sense.

## 4. Outcome

Without the reper,

package gravitation would remain an architecture without an operator of observability. With the reper, it gains the possibility to bind together: eginenumerate

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