

A partial list of references for Chiral Perturbation Theory in the Meson Sector

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1 Introduction

This is intended to be a mnemonic device for me, so it is not a review article nor a complete list of references but rather a list of papers I have used at some point and will want to find easily again. It is also skewed towards my own work but not even complete as regards references to that. In the published work I have tried to have complete literatures.

Especially ChPT for baryons and heavy quarks is very poorly represented. This list is a continuous work in progress.

2 Basic papers

The three main papers:

- Weinberg 1978 [1]
- Gasser-Leutwyler 2 flavour [2]
- Gasser-Leutwyler 3 flavour [3]

3 Other basic papers

- The short 2-flavour GL paper [4]

4 Oldies: i.e. before my time

Note only here if not under some other heading

- Goldberger-Treiman relation [5]
- PCAC [6, 7]
- Current algebra [8]
- Adler zeros/consistency conditions [9, 10]
- Gell-Mann–Oakes–Renner relation [11]
- Weinberg’s chiral lagrangian [12]
- The CCWZ formulation, including a powercounting argument [13, 14]

- There are chiral logs [15]
- Review early work on chiral logs [16]
- Related to the external field formalism [17, 18, 19]

5 Introductory

6 Reviews

- Anomalous sector [20]
- Two-loop review [21]

7 Extensions

7.1 Two-loops (principles)

- Formalism description [22]
- p^6 -Lagrangian Fearing-Scherer [23]
- p^6 -Lagrangian BCE [24]
- One term too many for $SU(2)$ [25]
- p^6 divergences and general formalism [26]
- relation 2-3 flavour: p^4 [3]
- relation 2-3 flavour: p^6 [27, 28]
- Relations independent of LECS [29]

7.2 Anomalous sector

- Steinberger [30]
- Bell-Jakiw in ABJ [31]
- Adler in ABJ [32]
- Adler-Bardeen theorem [33]
- Anomalous Ward identities, Bardeen [34]
- WZW Wess-Zumino [35]
- WZW Witten [36]
- Divergences: Donoghue-Wyler (principle good but wrong) [37], First correct [38], probably wrong [39], Issler [40, 41]
- Divergence final [42], but note bit missing in 2-flavour case in first version.
- p^6 -Lagrangian [42, 43]
- Two-flavour WZW [44]

7.3 Finite volume

- The start [45]
- $O(N)$ model [46]
- Another way to do the integrals [47]
- Twisted boundary conditions [48]

7.4 Finite temperature

- The start [49, 50]

7.5 Including electromagnetism

- The start [51, 52]
- Partially quenched [53]
- With leptons [54]

7.6 Including weak interactions

- With electromagnetism $K \rightarrow \pi\pi$ [55]

7.7 Quenched

7.8 Partially quenched

7.9 Energy-momentum tensor

At one-loop [56]

7.10 Vectors with anti-symmetric tensor

- Tree level [57]
- At one loop (i.e. p^6) [58]

7.11 Vector meson ChPT

- First paper [59]
- $\tau \rightarrow VP\nu_\tau$ [60]
- Masses to p^4 [61]
- Matching, some theoretical issues [62]
- Decay constants [63]
- IR regularization [64]
- f_V^T/f_V [65]

7.12 Tensor mesons

- Start: [66]
- Quenched/partially quenched [67]

7.13 Heavy kaons

7.14 Other symmetry groups

This includes $SU(N) \times SU(N)/SU(N)$ but these are often listed as N -flavour results in the other sections.

8 Processes

8.1 Masses

- One-loop two flavour
- Two-loop two flavour
- One-loop three flavour
- Two-loop three flavour
- One-loop N flavour
- Two-loop N flavour [68]

8.2 Decay constants

8.3 $\pi\pi$ scattering

- Tree level [69]
- One-loop/Chiral logs [70, 71]
- One-loop [72, 2]
- Two-loops, nonanalytic part [73]
- Two-loops [74, 22]
- One-loop 3-flavour [75]
- Two-loop 3-flavour [76]
- One-loop N -flavour [77]
- Two-loop N -flavour [78]

8.4 πK scattering

- One-loop [75]
- Two-loop [79]

8.5 Electromagnetic formfactors

• At one-loop [99] [100]

- 2 flavour pion one-loop [2]
- 2 flavour pion two-loop [80]
- 3 flavour pion and kaon: one-loop [81]
- 3 flavour pion and kaon: two-loop [82]

8.6 Scalar formfactors

- 2 flavour pion one-loop [2]
- 2 flavour pion two-loop [80]
- 3 flavour pion and kaon: one-loop [81]
- 3 flavour pion and kaon: two-loop [83]

8.7 $\eta \rightarrow 3\pi$

- Current algebra [84]
- Tree level [85, 86]
- Chiral logs [87]
- One-loop [88]
- Two-loop [89]

8.8 τ -decays

- two-flavour case [90]
- The vector formfactor parts can be taken from the two-loop calculations of these.
- The axial form-factor

8.9 $\gamma \rightarrow \pi\pi\pi$

- Tree level [91, 92]
- One-loop [93], off-shell in [94]
- Electromagnetic corrections [95]
- A very partial two-loop calculation [96]
- Chiral logs high order [97]

8.10 $\eta \rightarrow \pi^0\gamma\gamma$

- One-loop [98]

8.11 $\gamma\gamma \rightarrow \pi\pi\pi$

- Current algebra [91]

8.12 $K_{\ell 3}$

- Logs [101]
- One-loop [81]
- Two-loops [102]
- Ademallo Gatto for partially quenched [103]
- Radiative corrections [104]

9 Information on coupling constants

9.1 Estimates: resonance saturation

- Vector mesons already in first GL paper [2]
- Resonance saturation: EGPR [57]
- Resonance saturation: Donoghue et al. [105]
- Vector meson part independent of parametrization [106]

10 Chiral logarithms only

Note: many are named in the specific processes and not here

11 Renormalization group

- General idea: [1]
- Double logs $\pi\pi$ [107]
- Double logs: general [108]
- General proof
- Massless limit applications

12 Tools

- A mathematica program for one-loop up to six legs [109]

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