

# HNCO

## Visualization of Walsh transforms of various functions defined on bit vectors

June 29, 2018

### Abstract

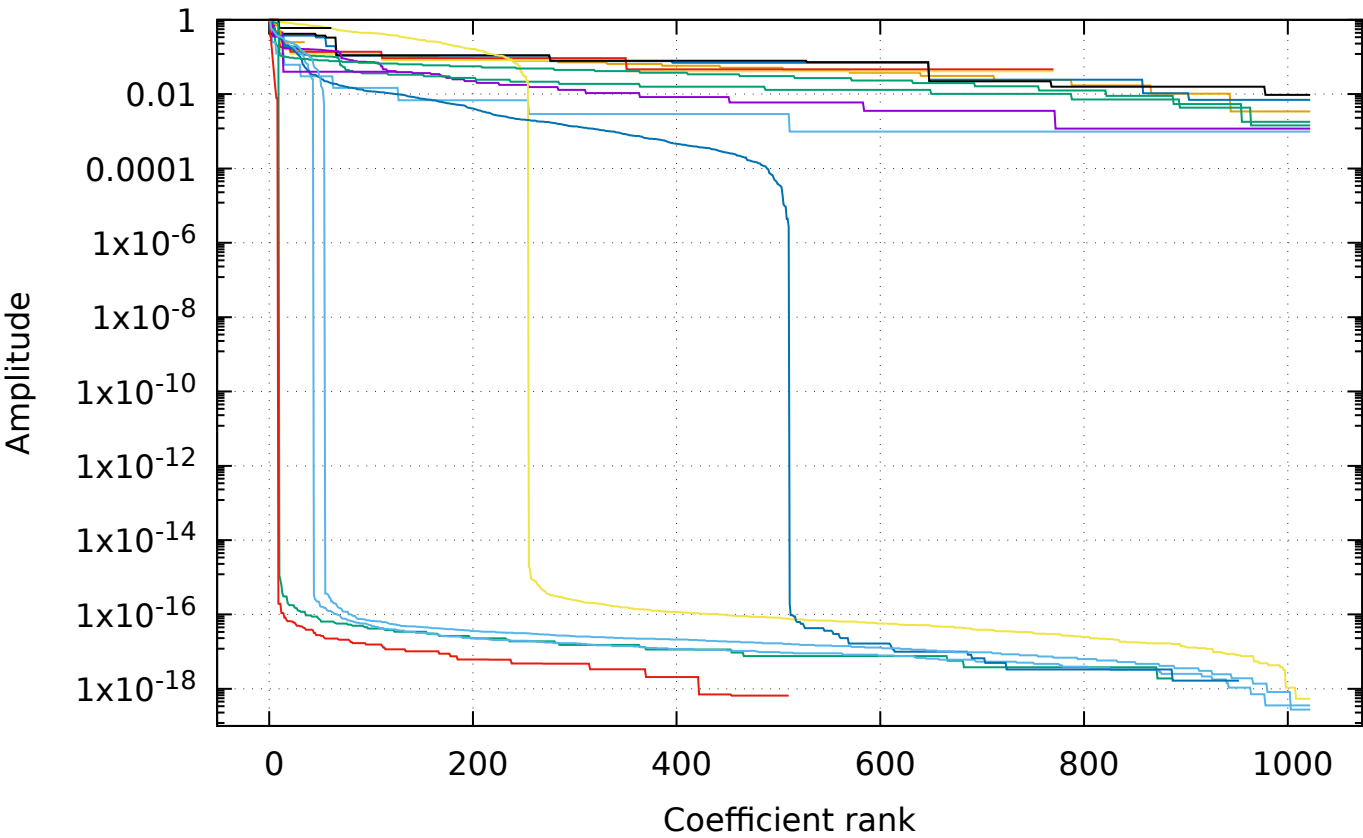
This document proposes to visualize Walsh (or Fourier) transforms of various functions defined on bit vectors (hypercube) of size  $n = 10$ . For each function, two graphics are displayed. In the first one, coefficients of the Walsh transform are sorted in decreasing order of amplitude and normalized relatively to the greatest amplitude. In particular, we are interested in how fast coefficient amplitudes decrease. The second graphics displays the energy (sum of square of coefficients) as a function of the order (or Hamming weight) of features. This can be thought of as a spectrum.

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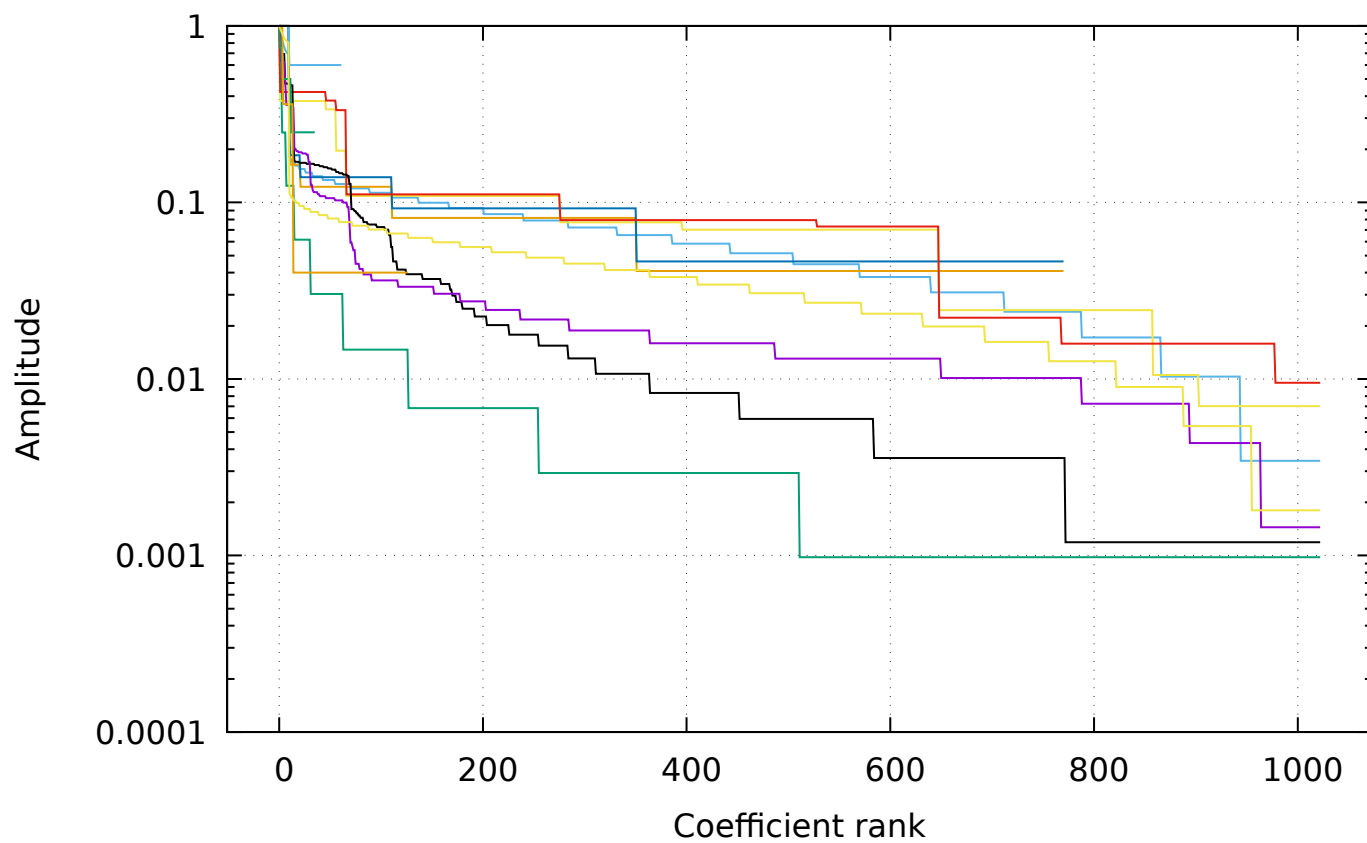
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1

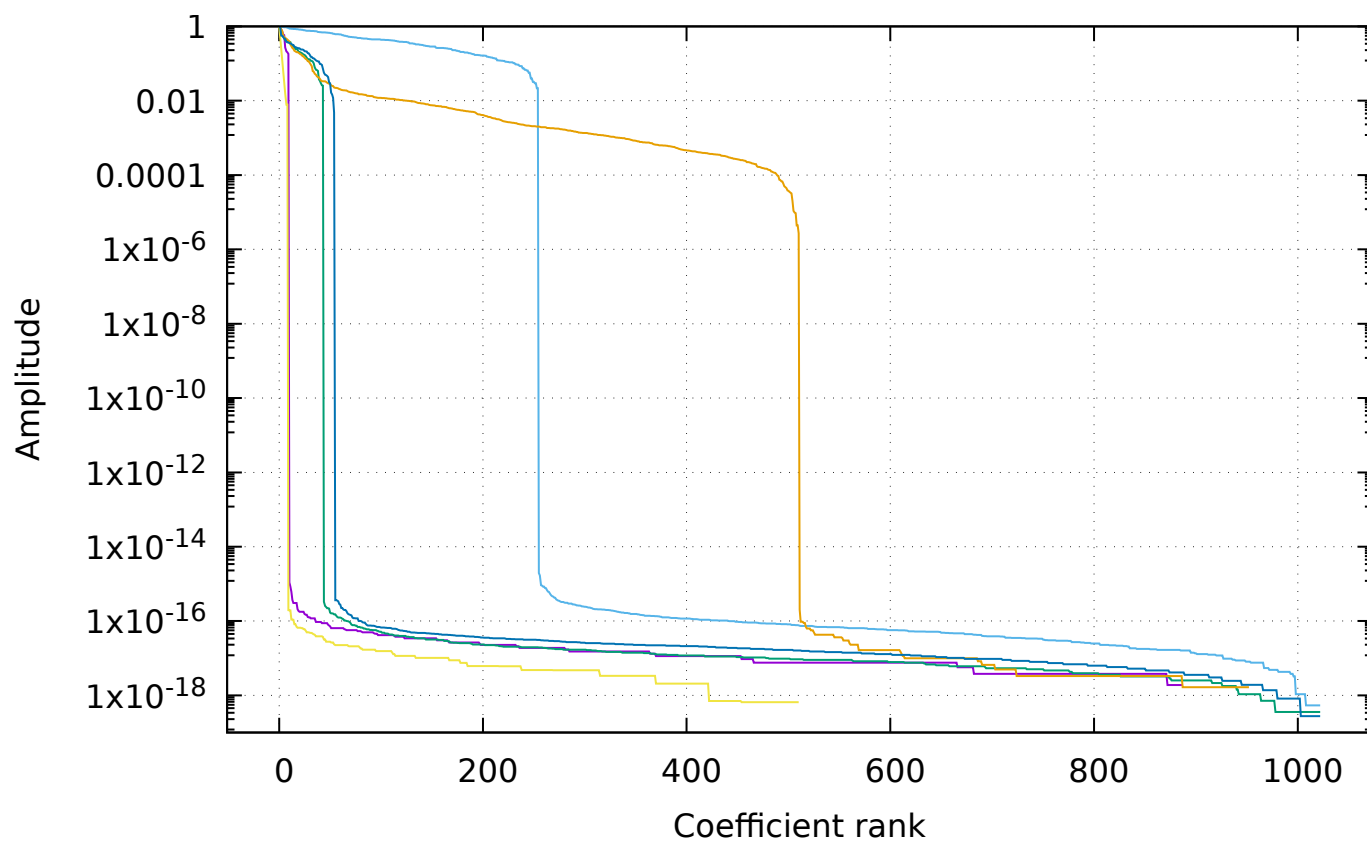
All functions



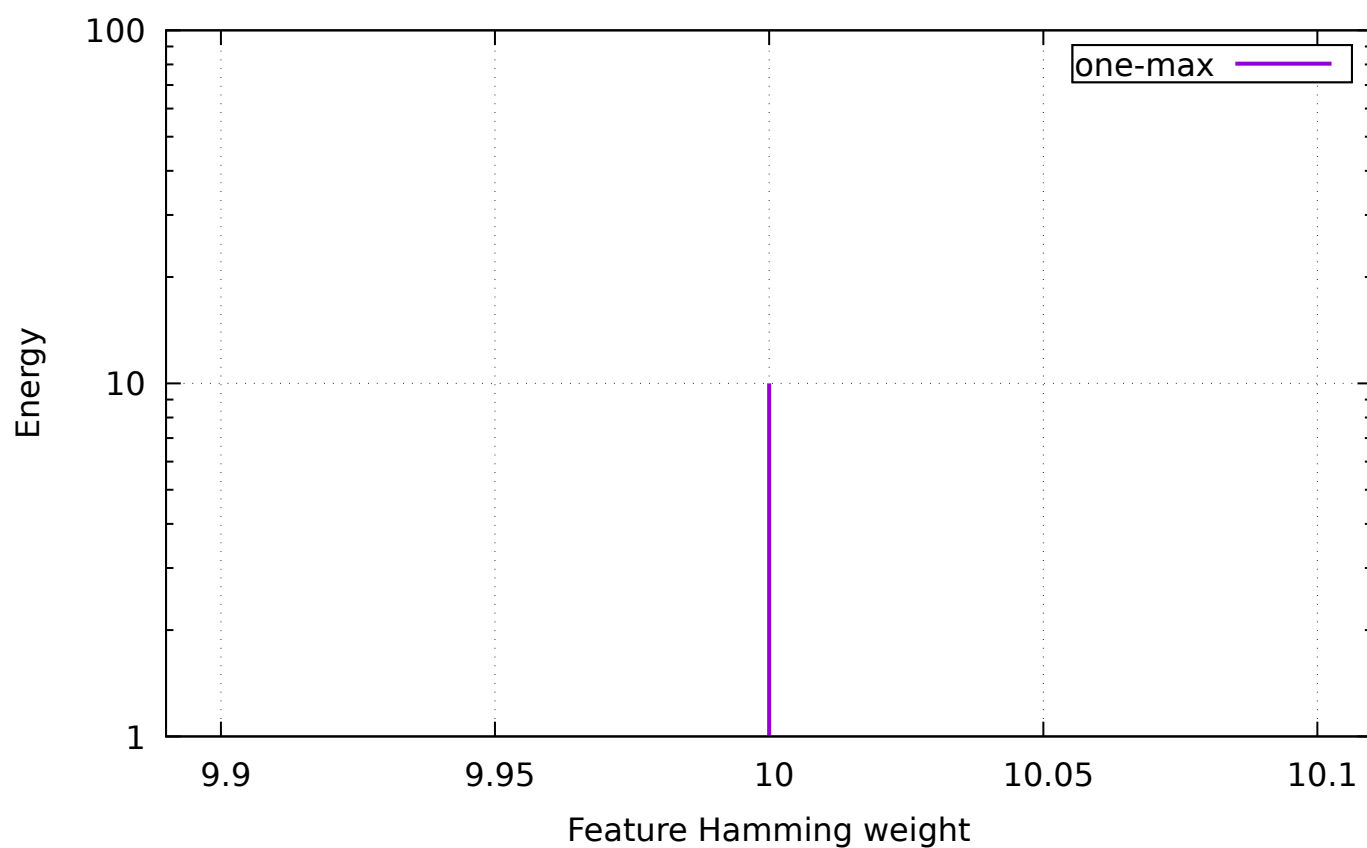
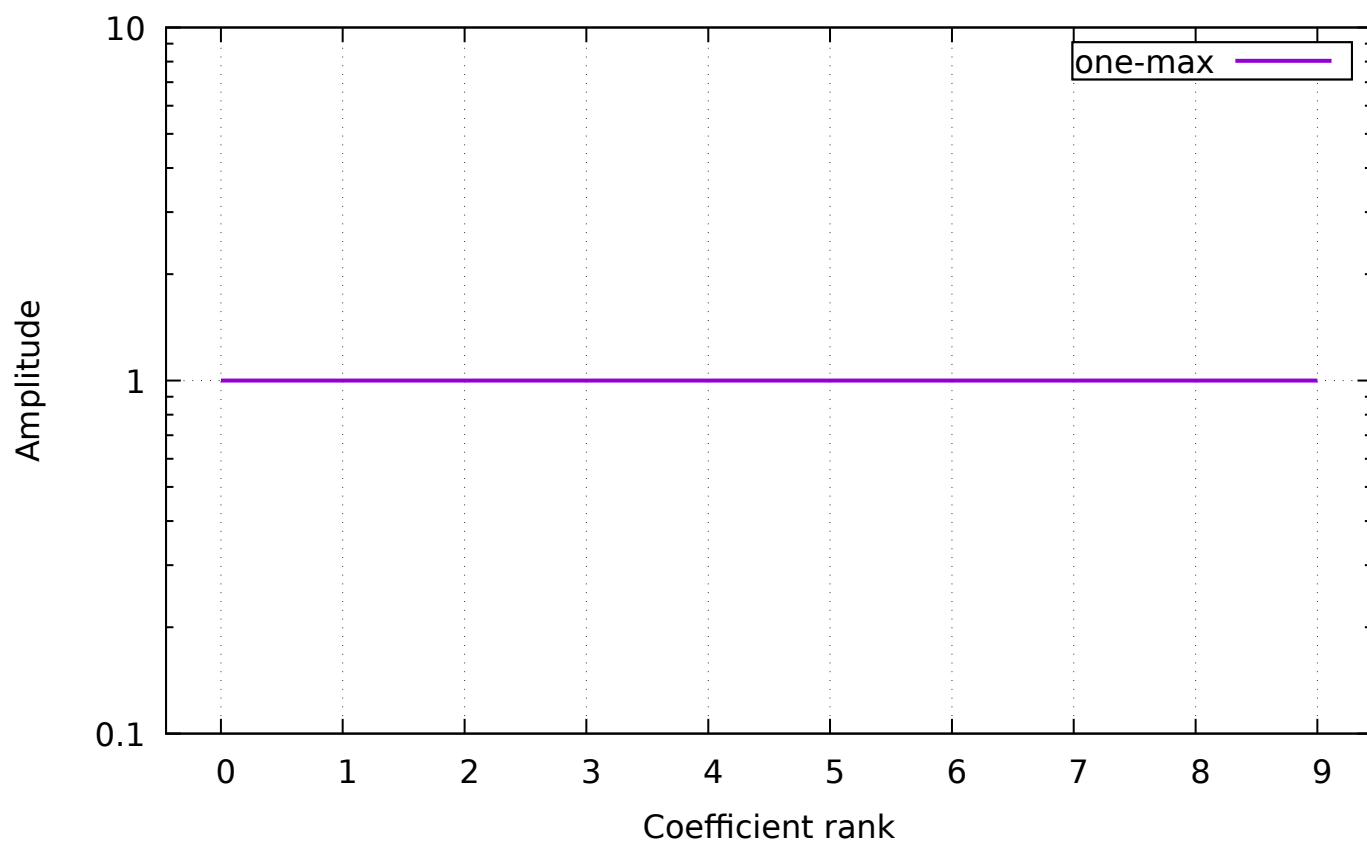
## 2 group1



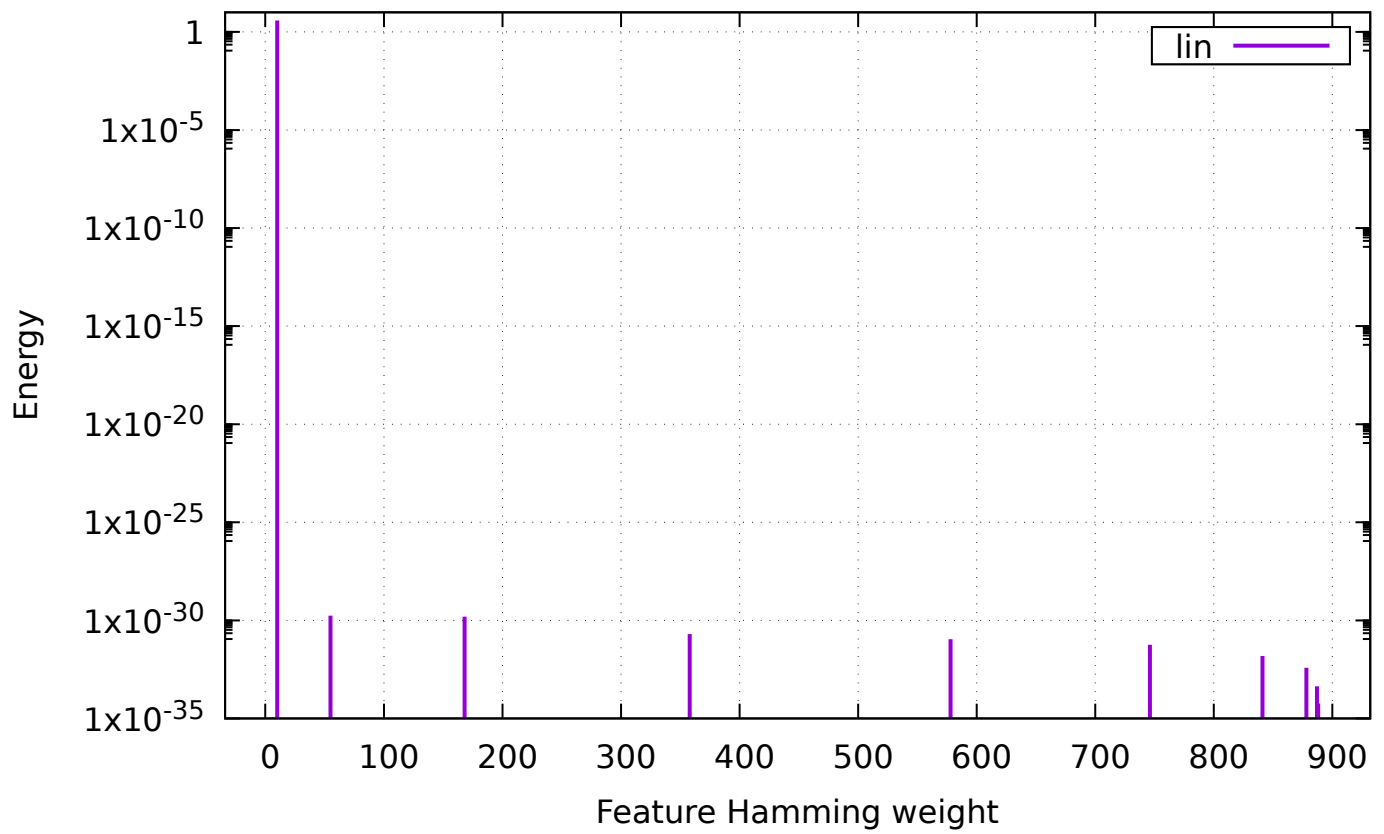
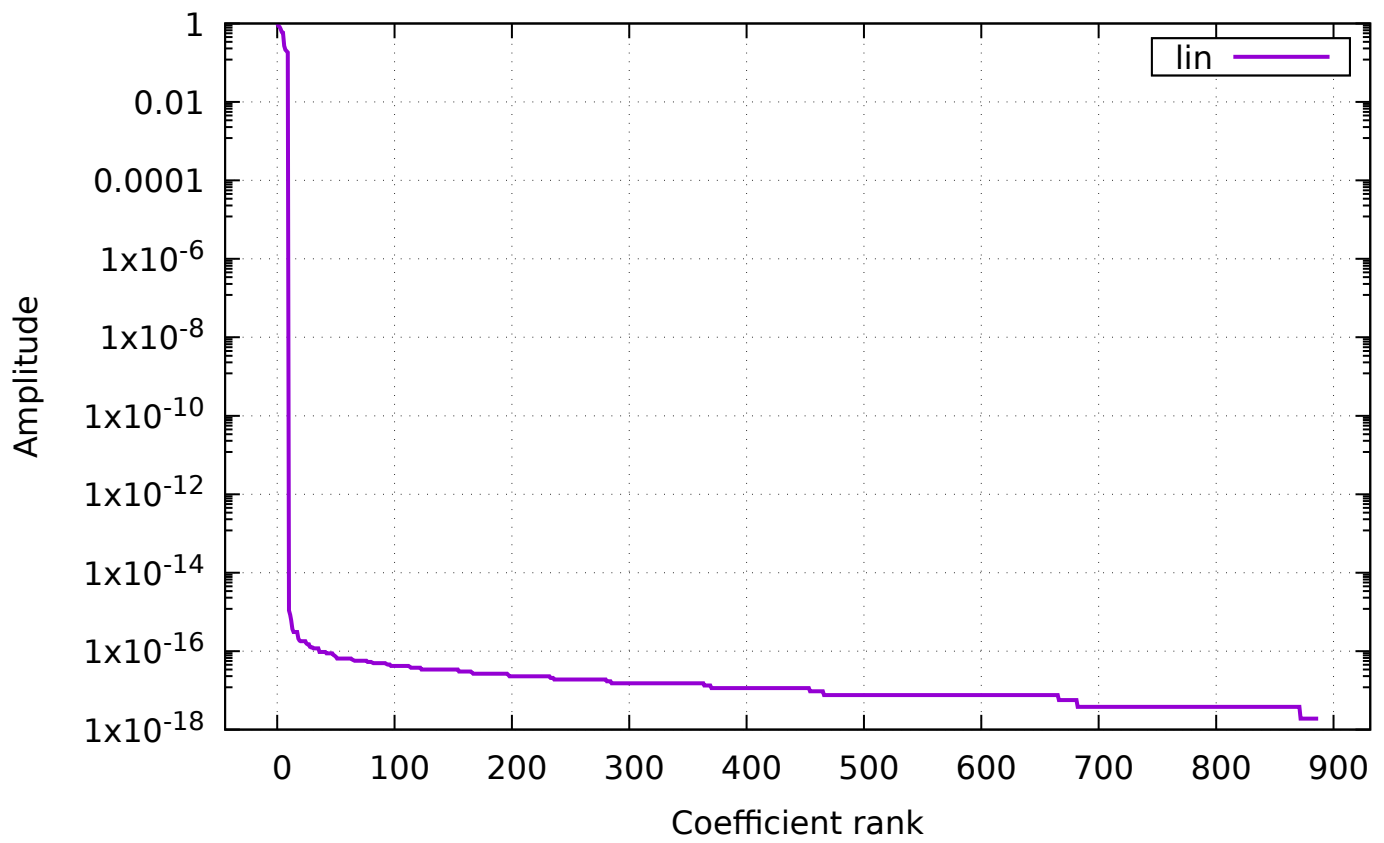
## 3 group2



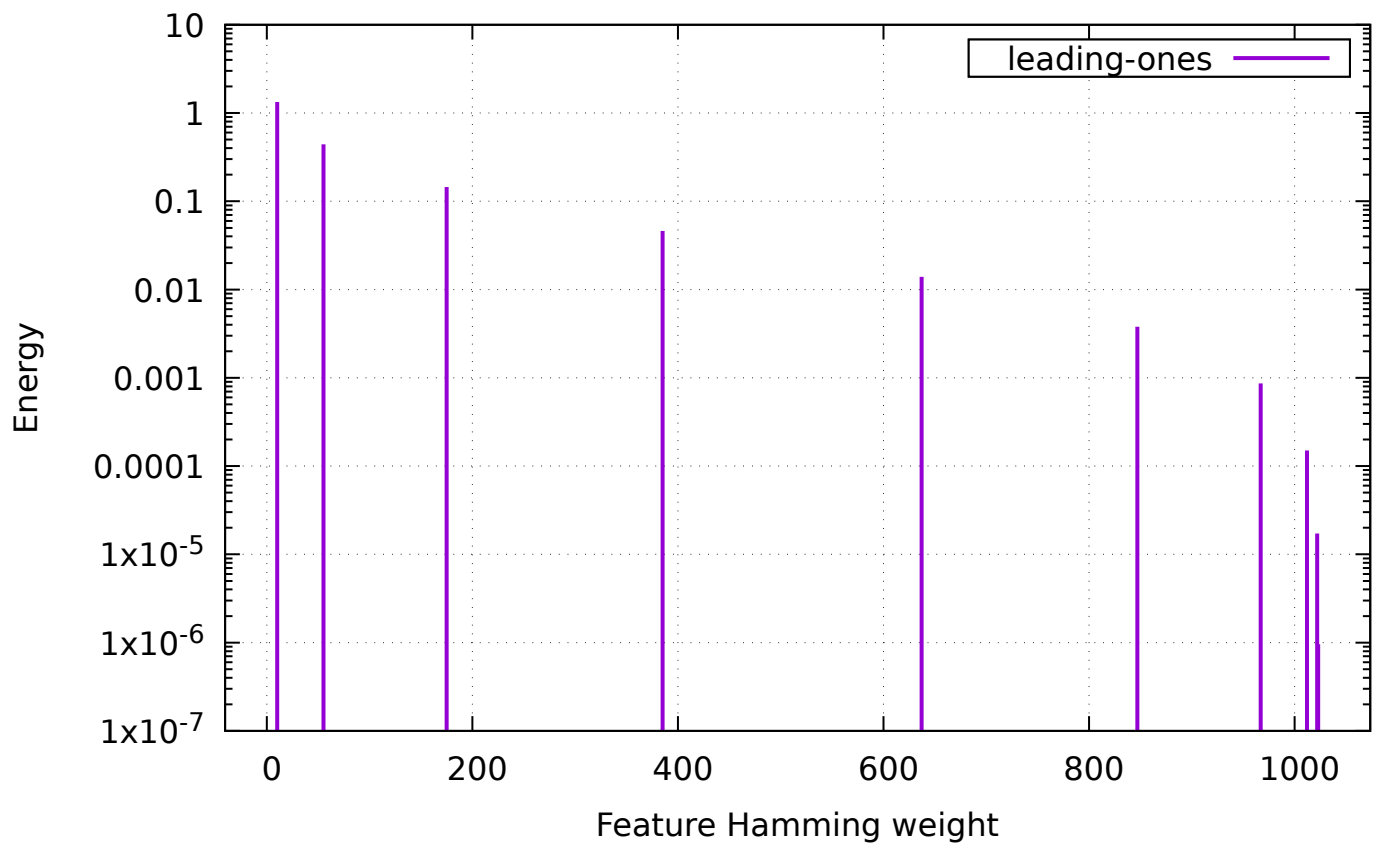
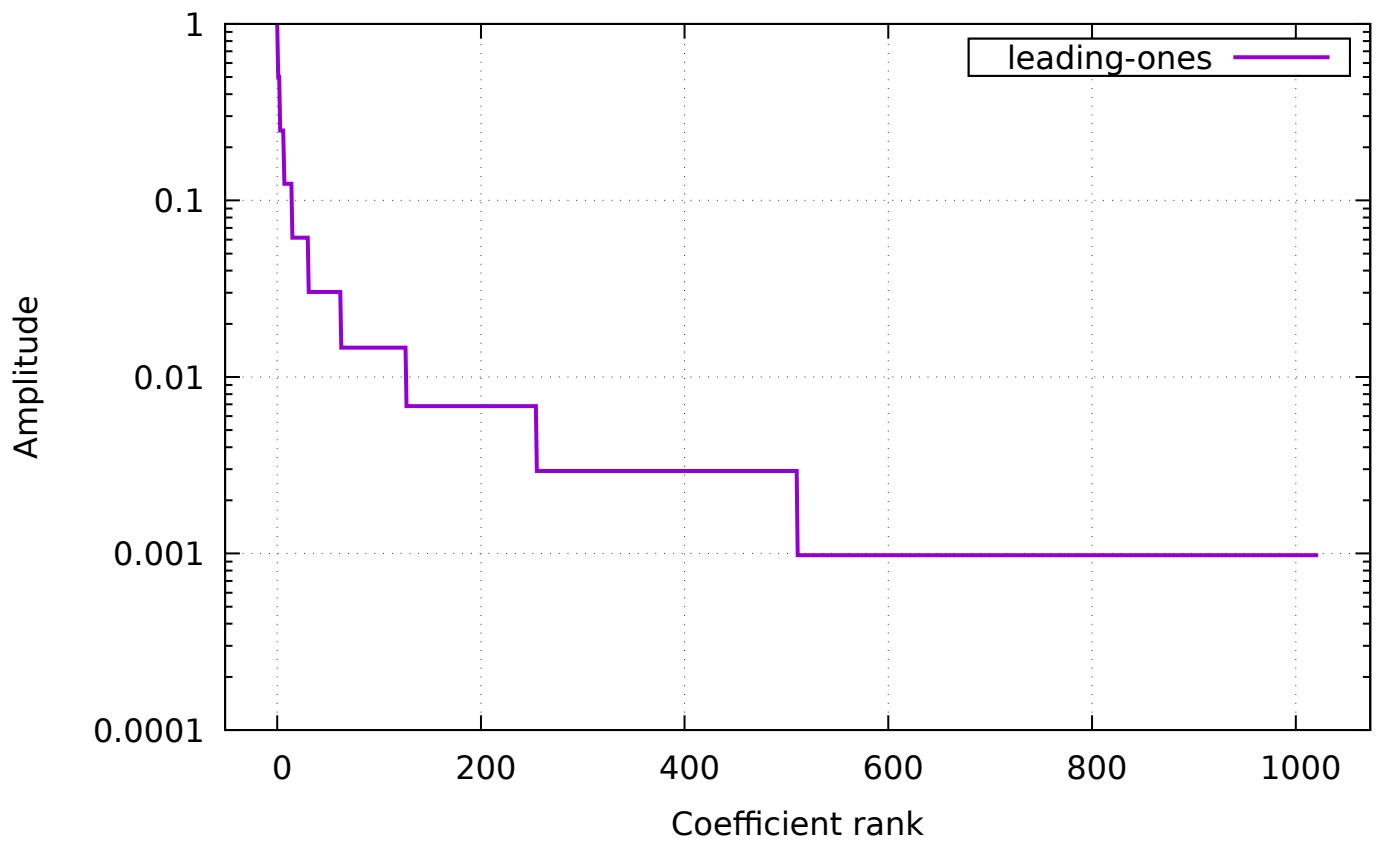
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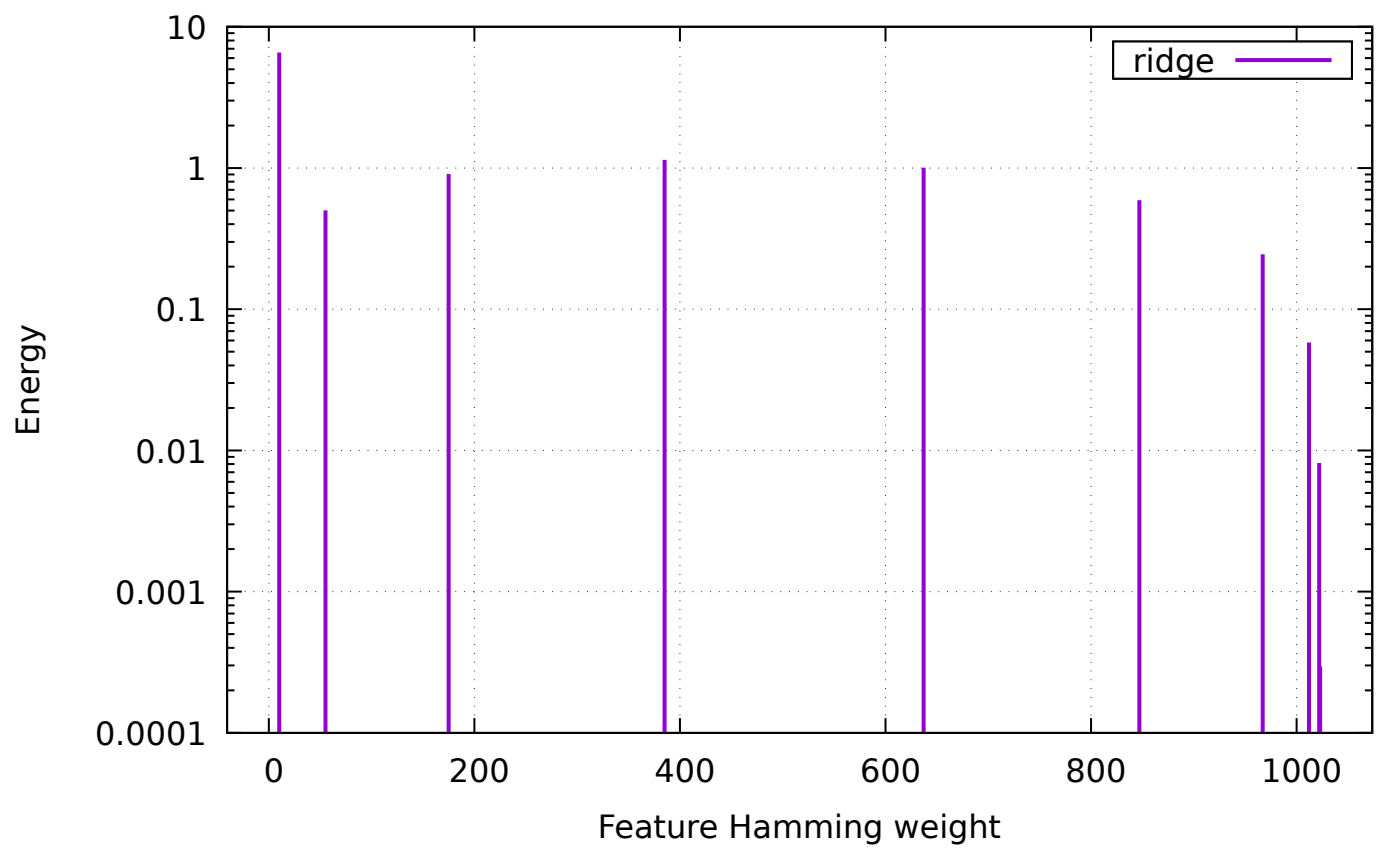
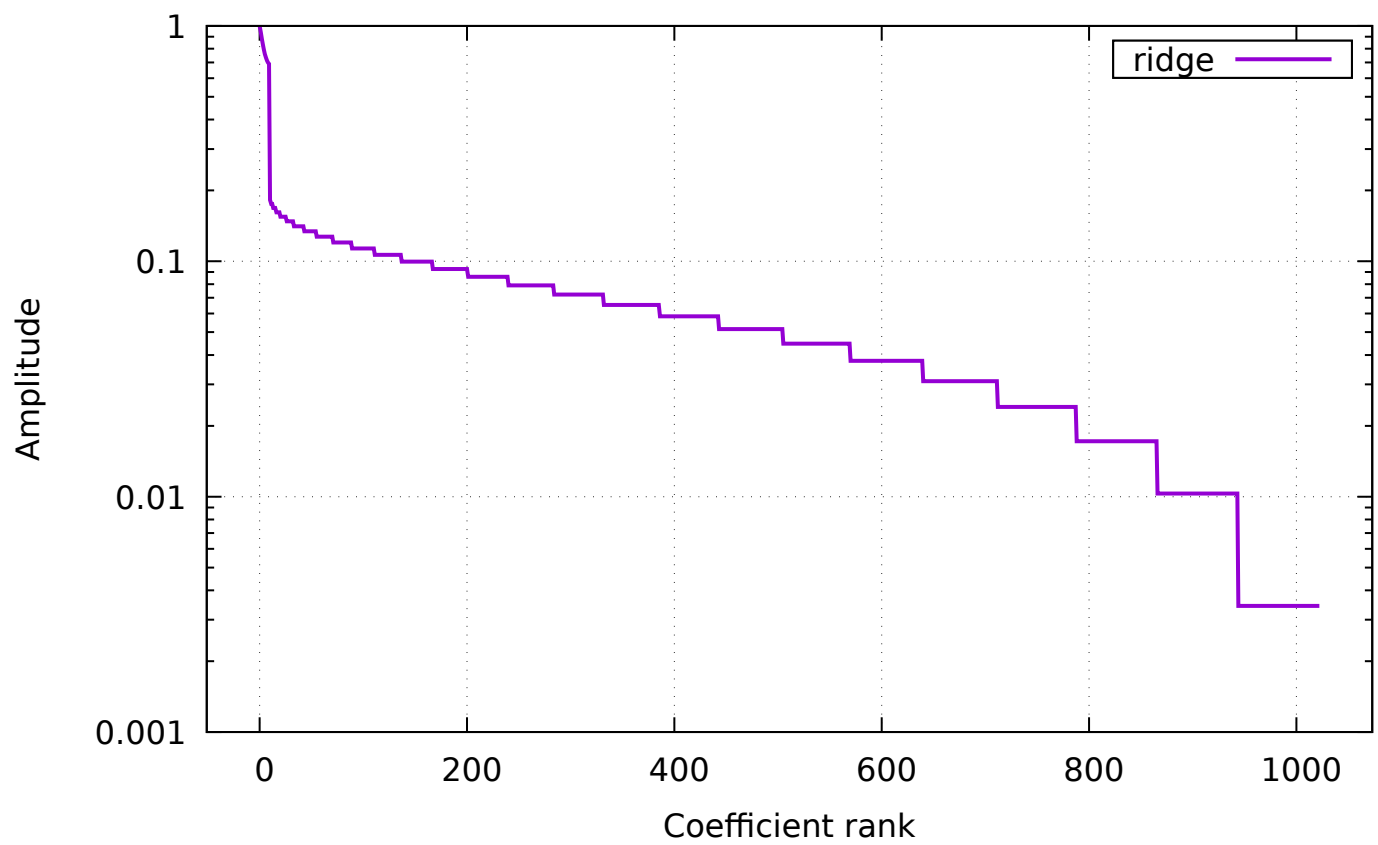
5 lin



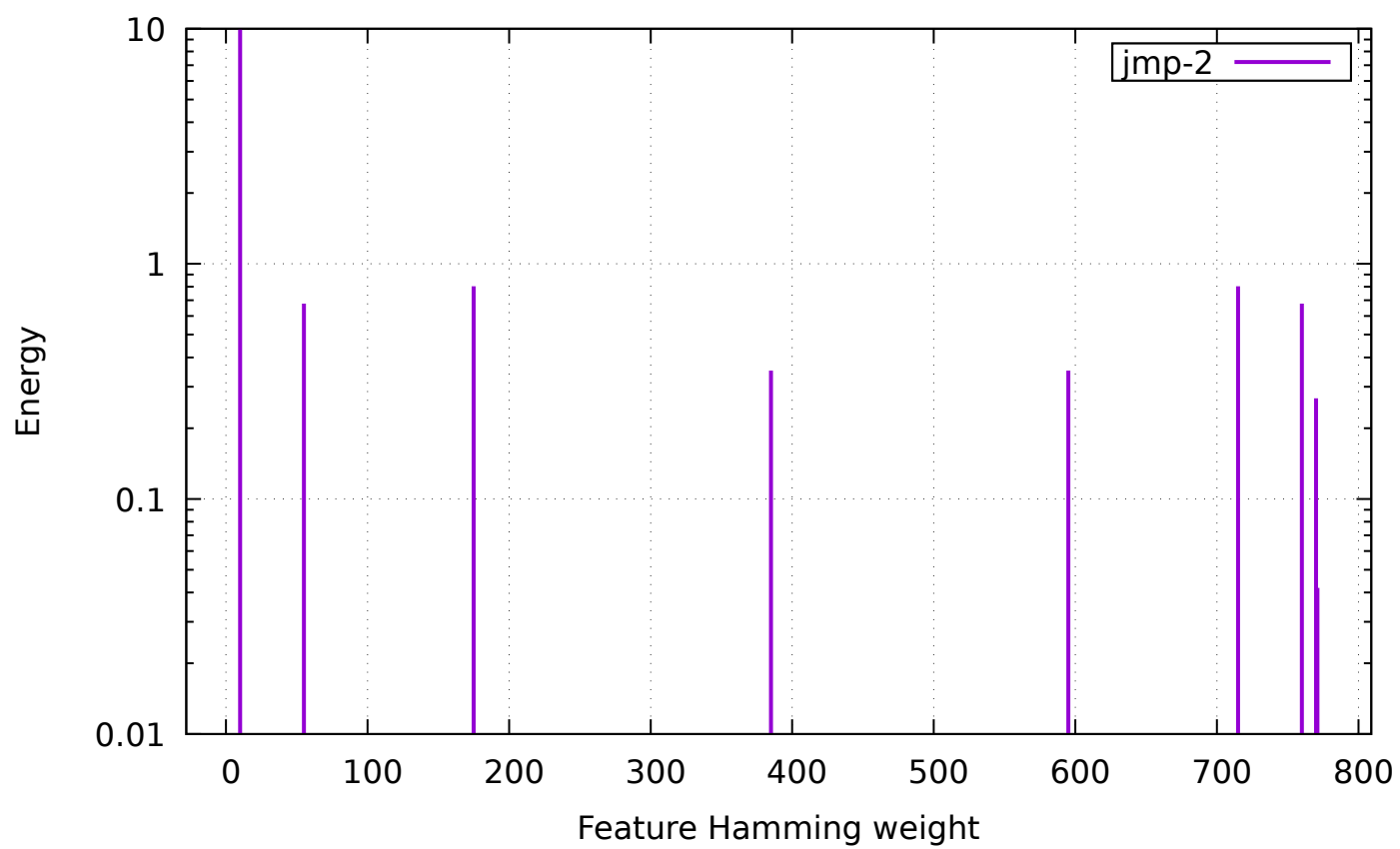
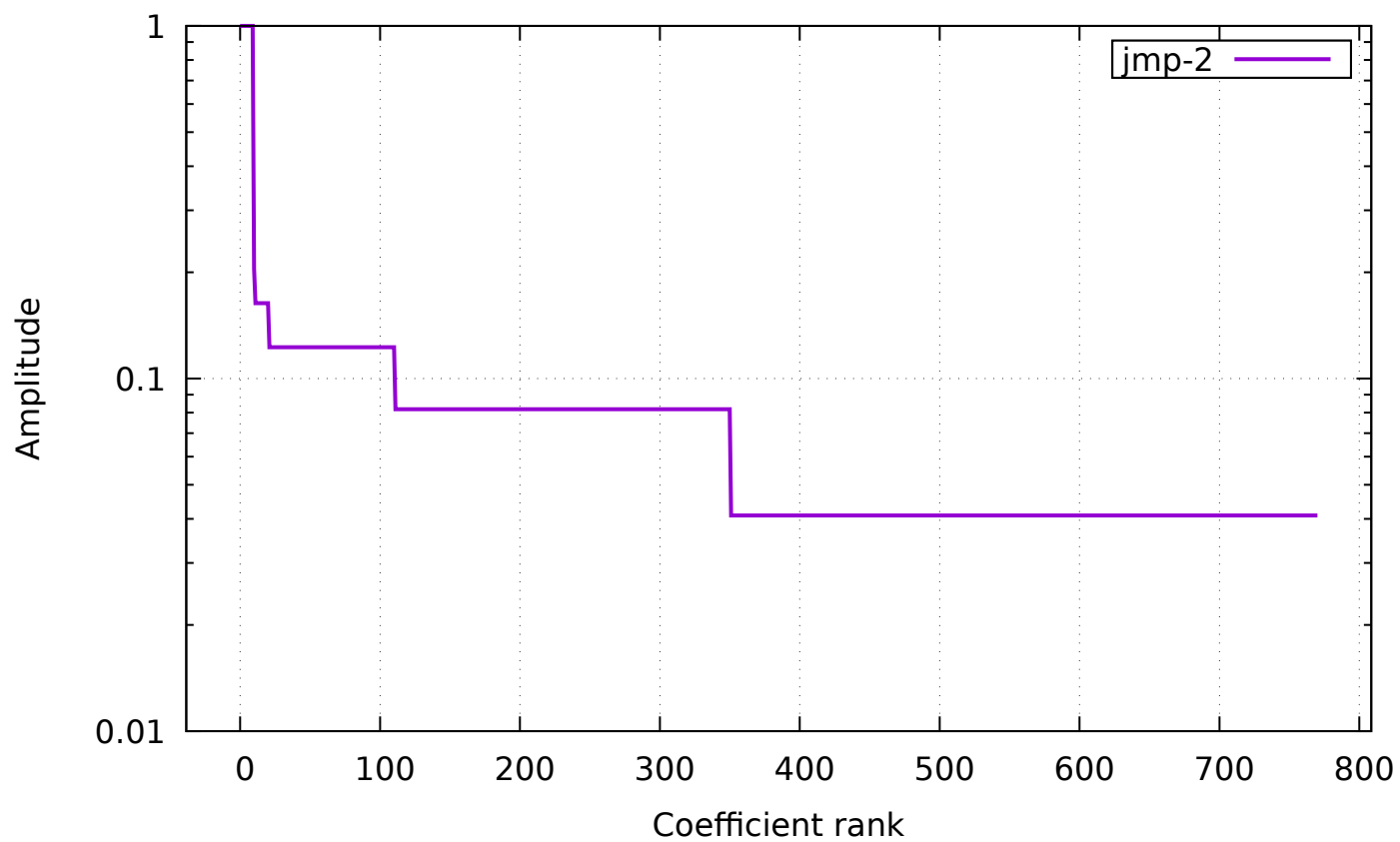
## 6 leading-ones



## 7 ridge

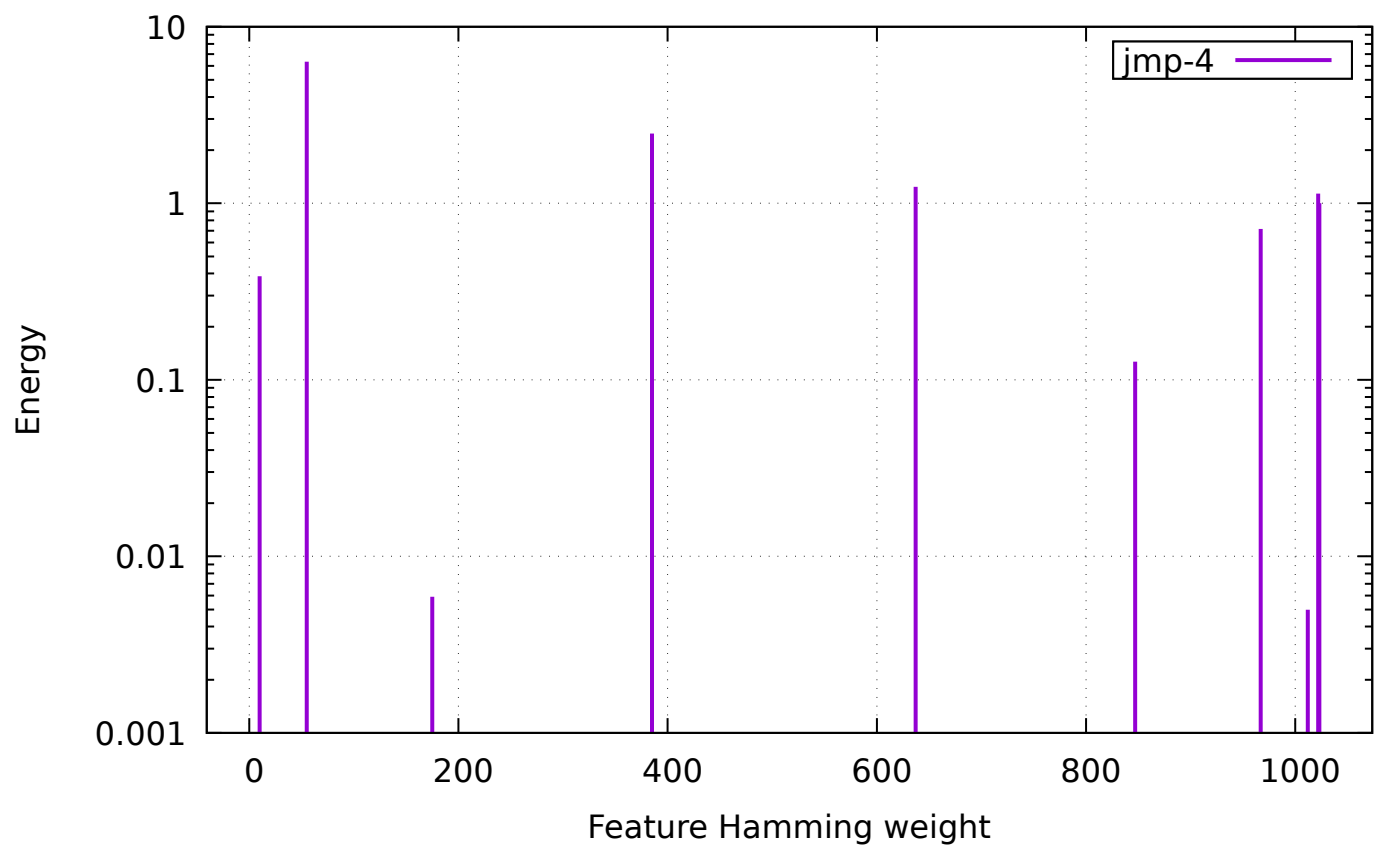
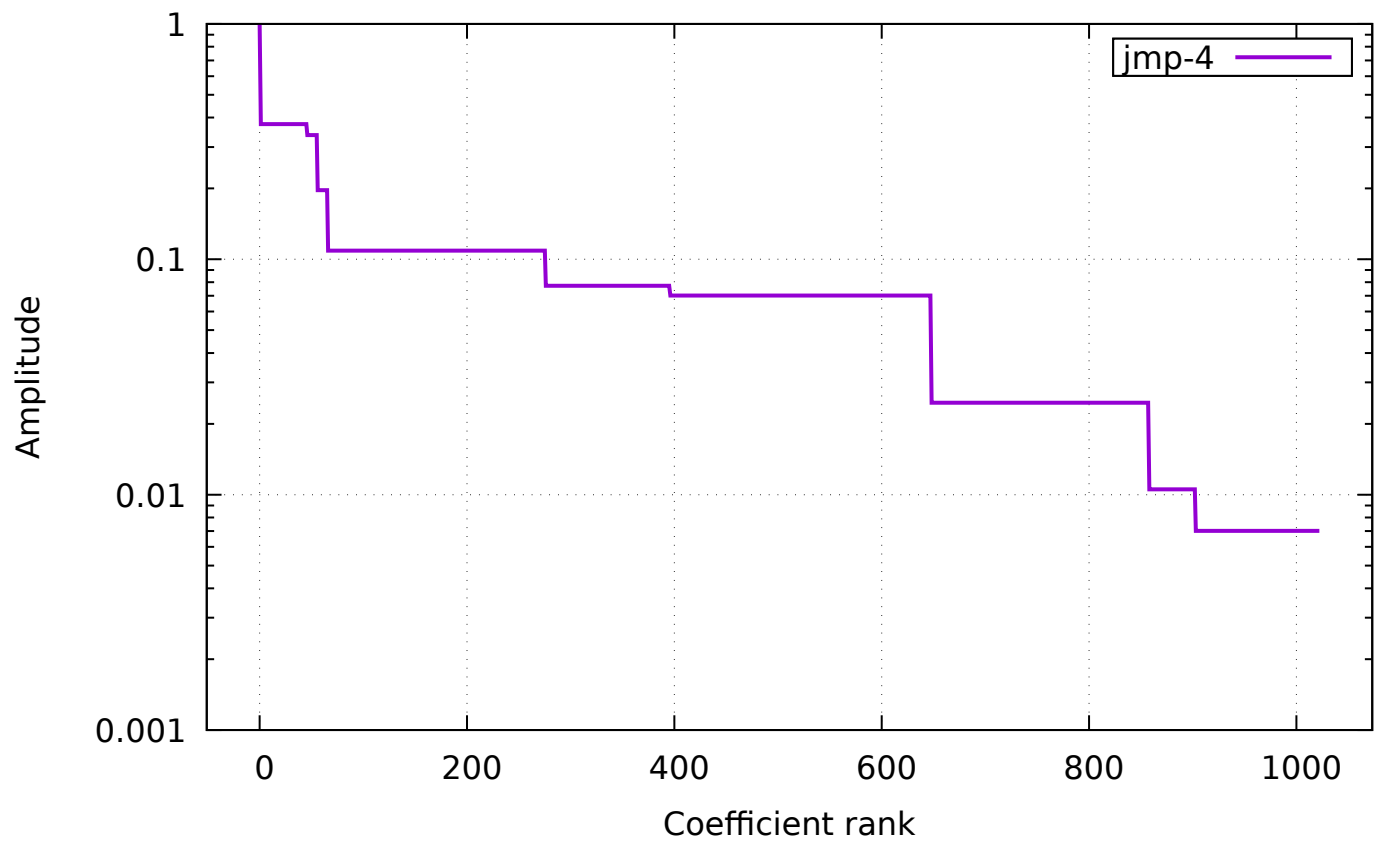


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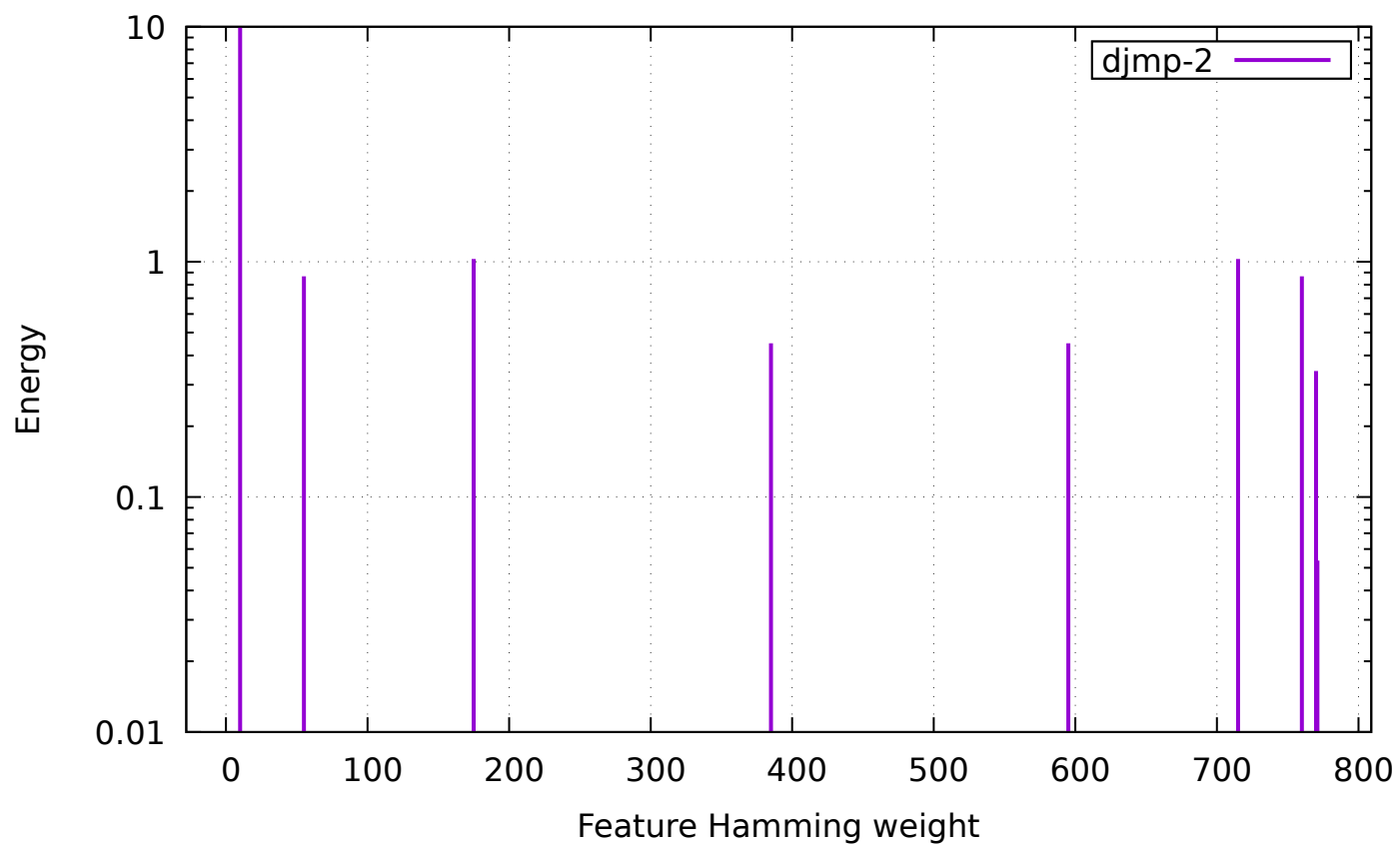
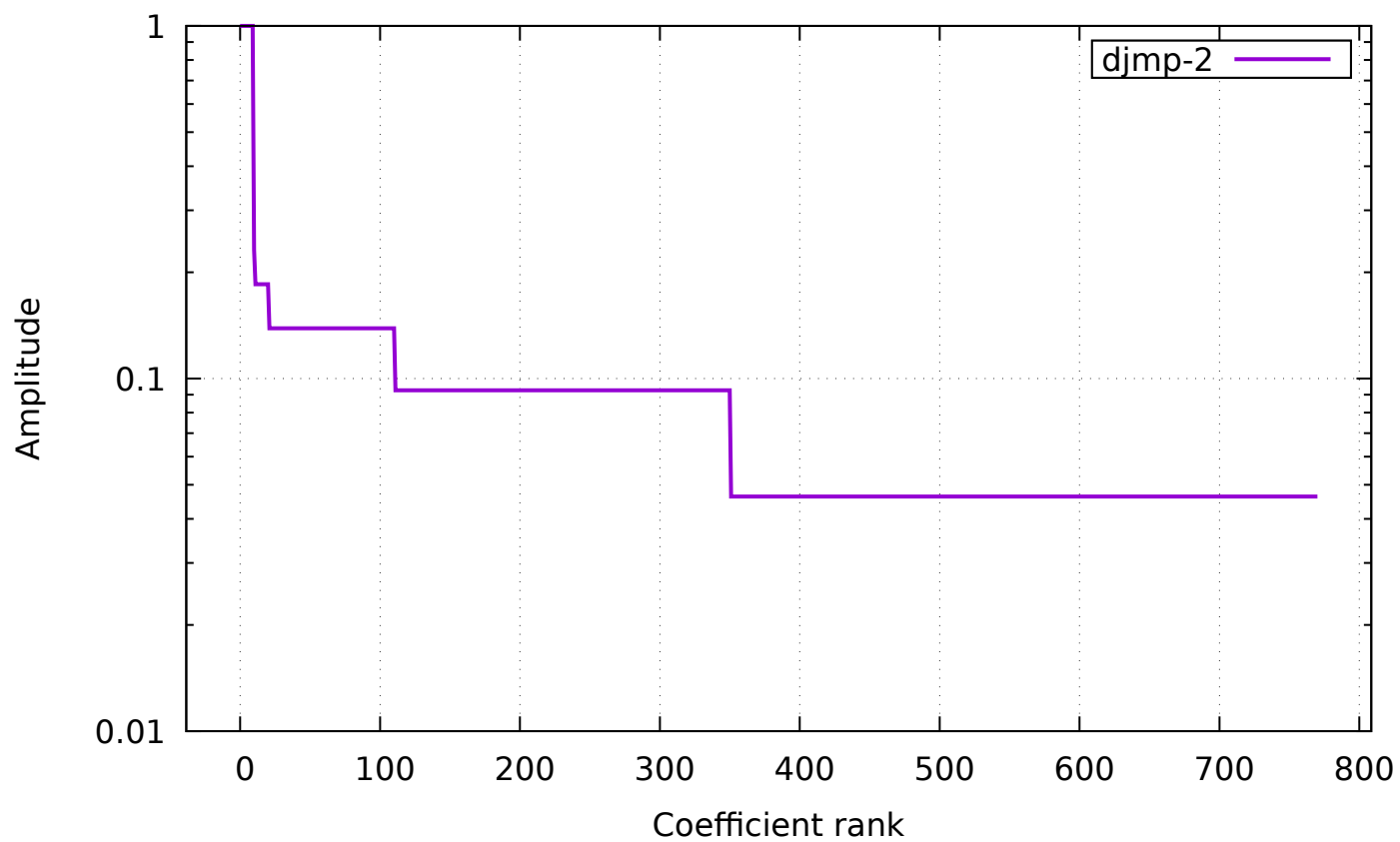




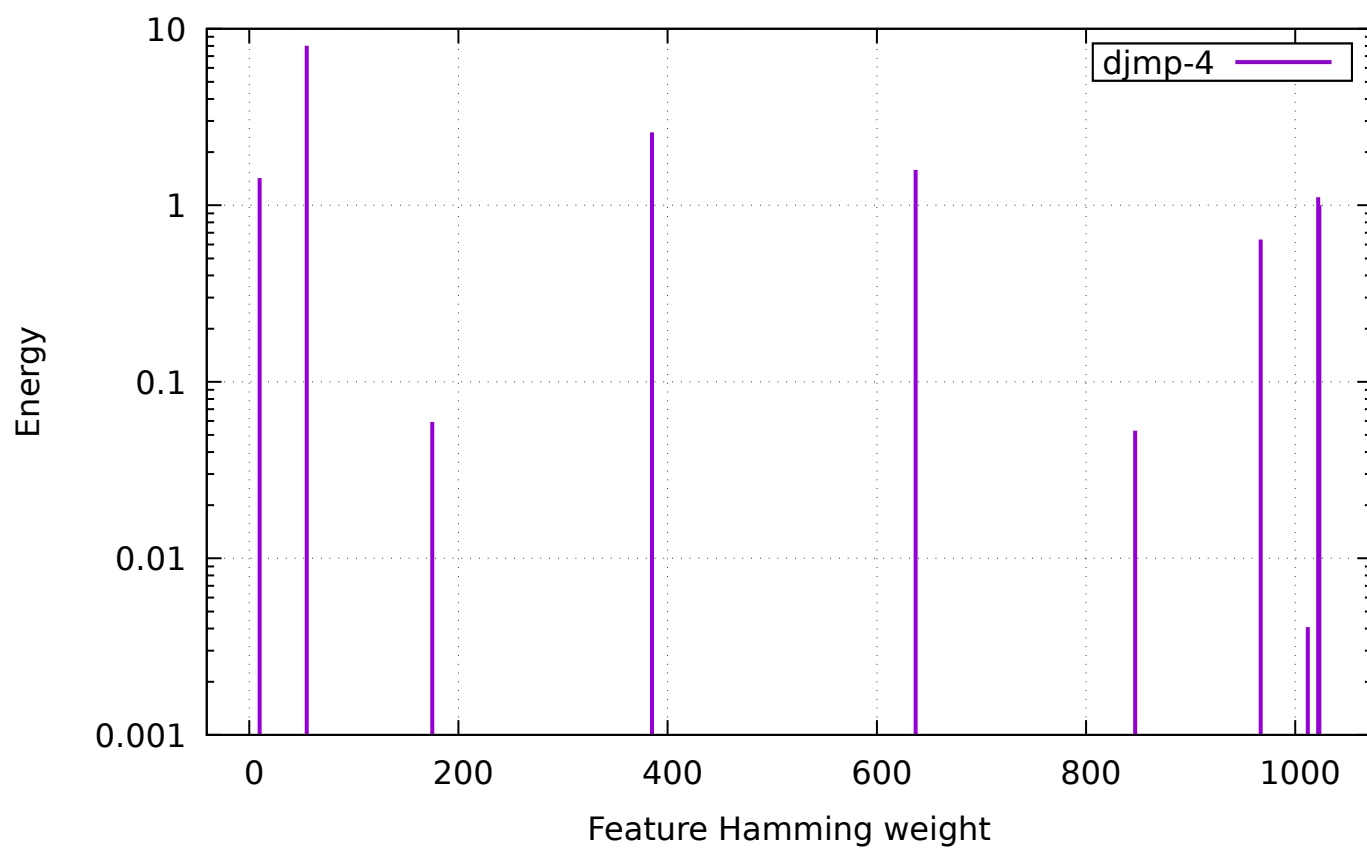
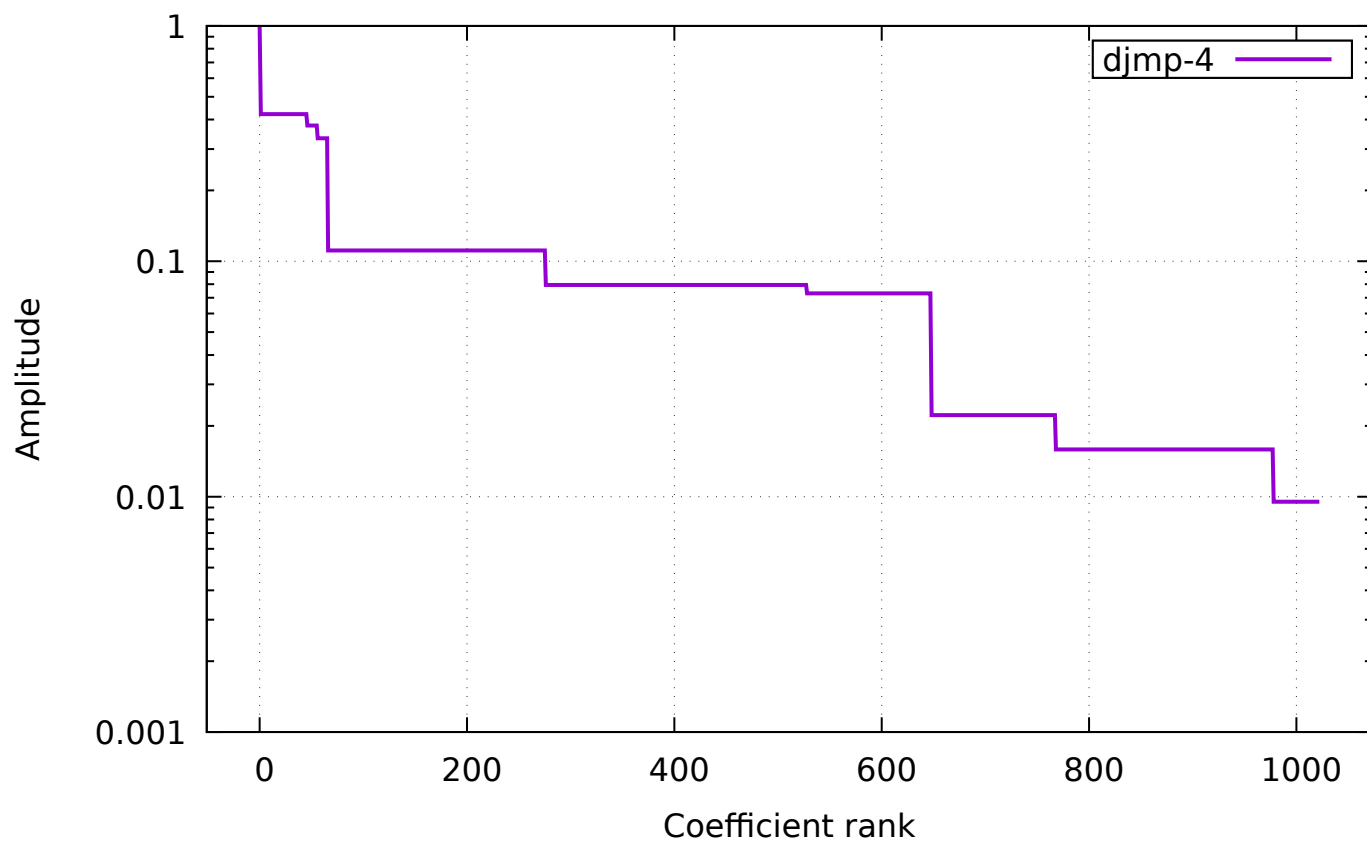
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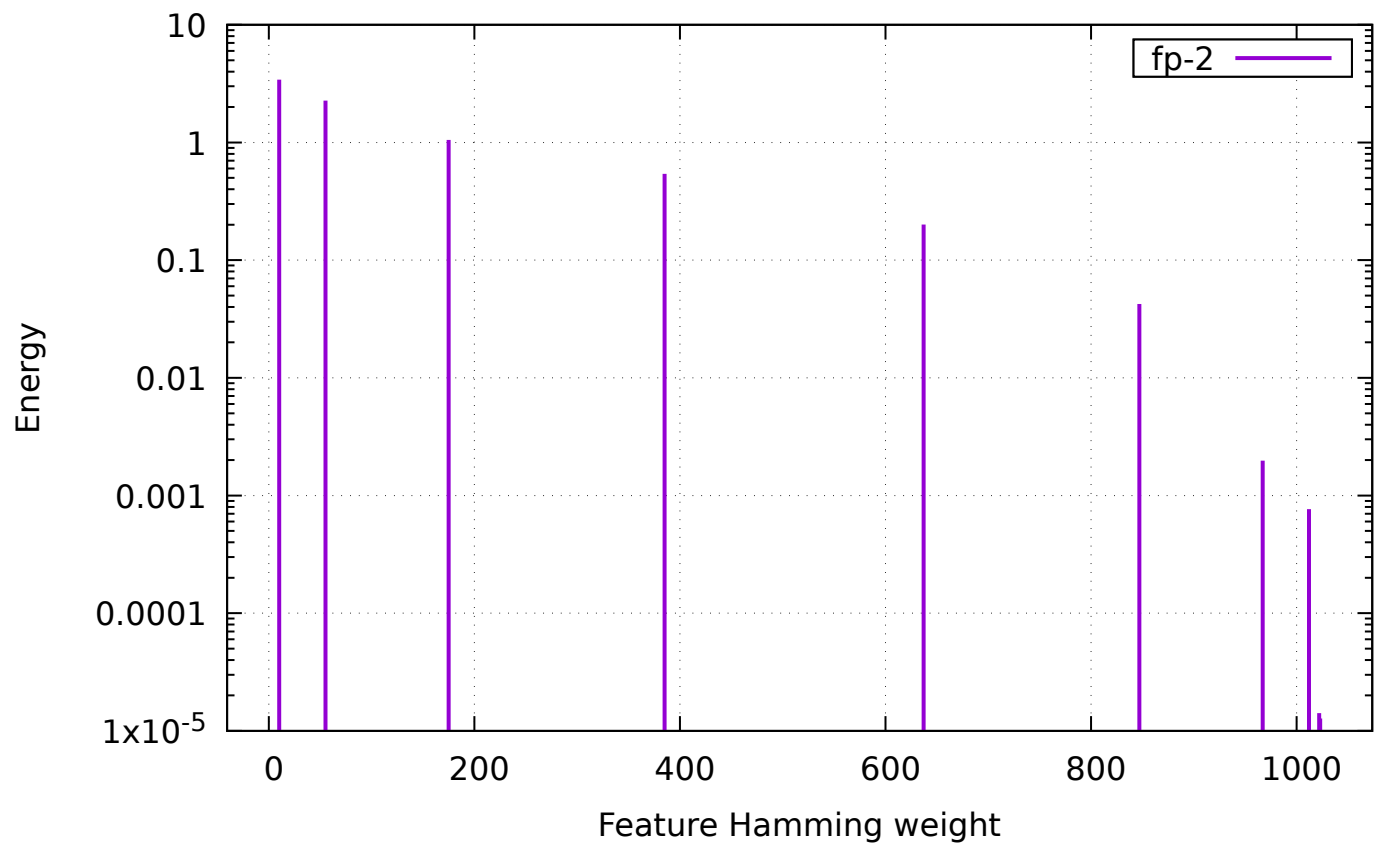
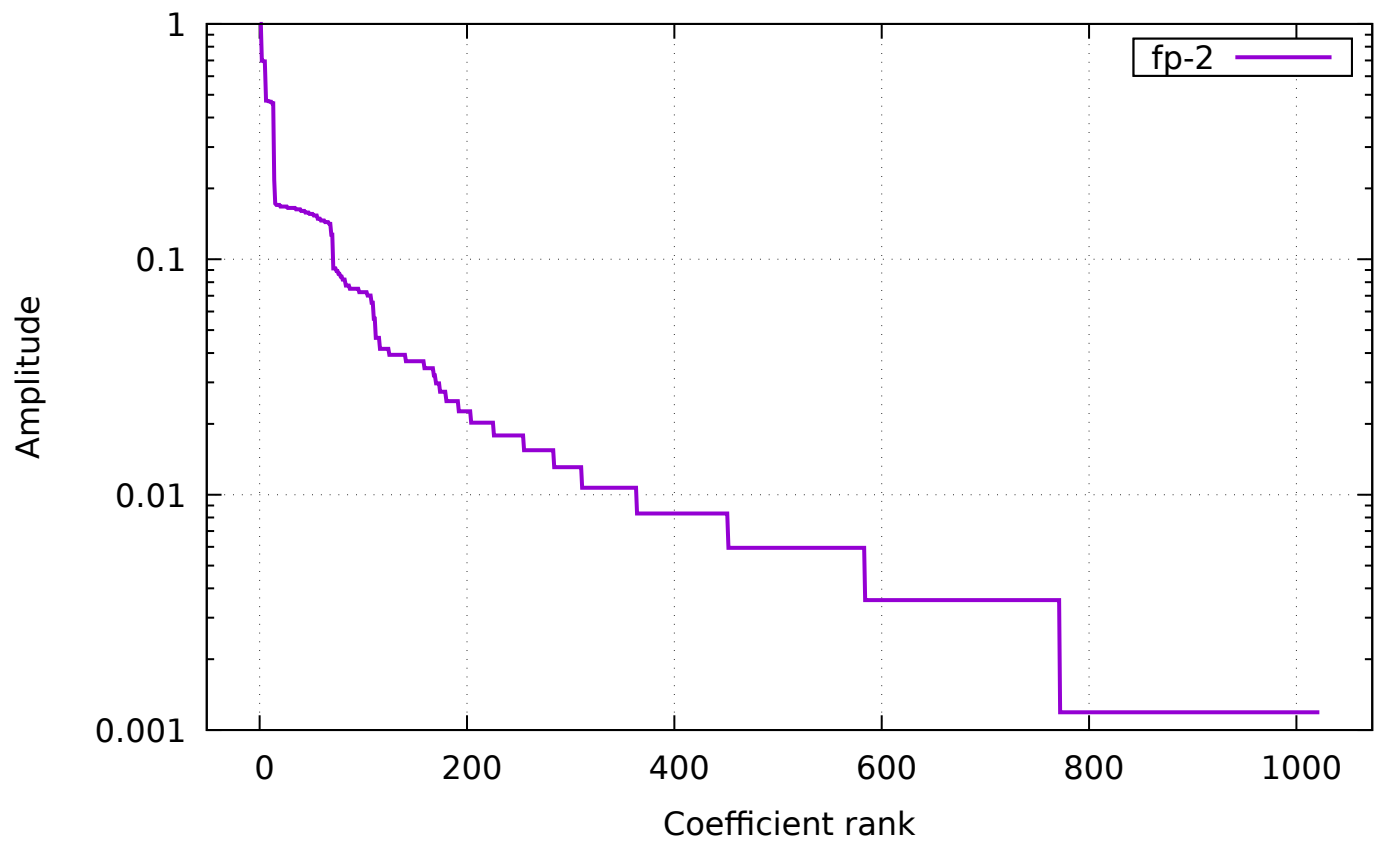


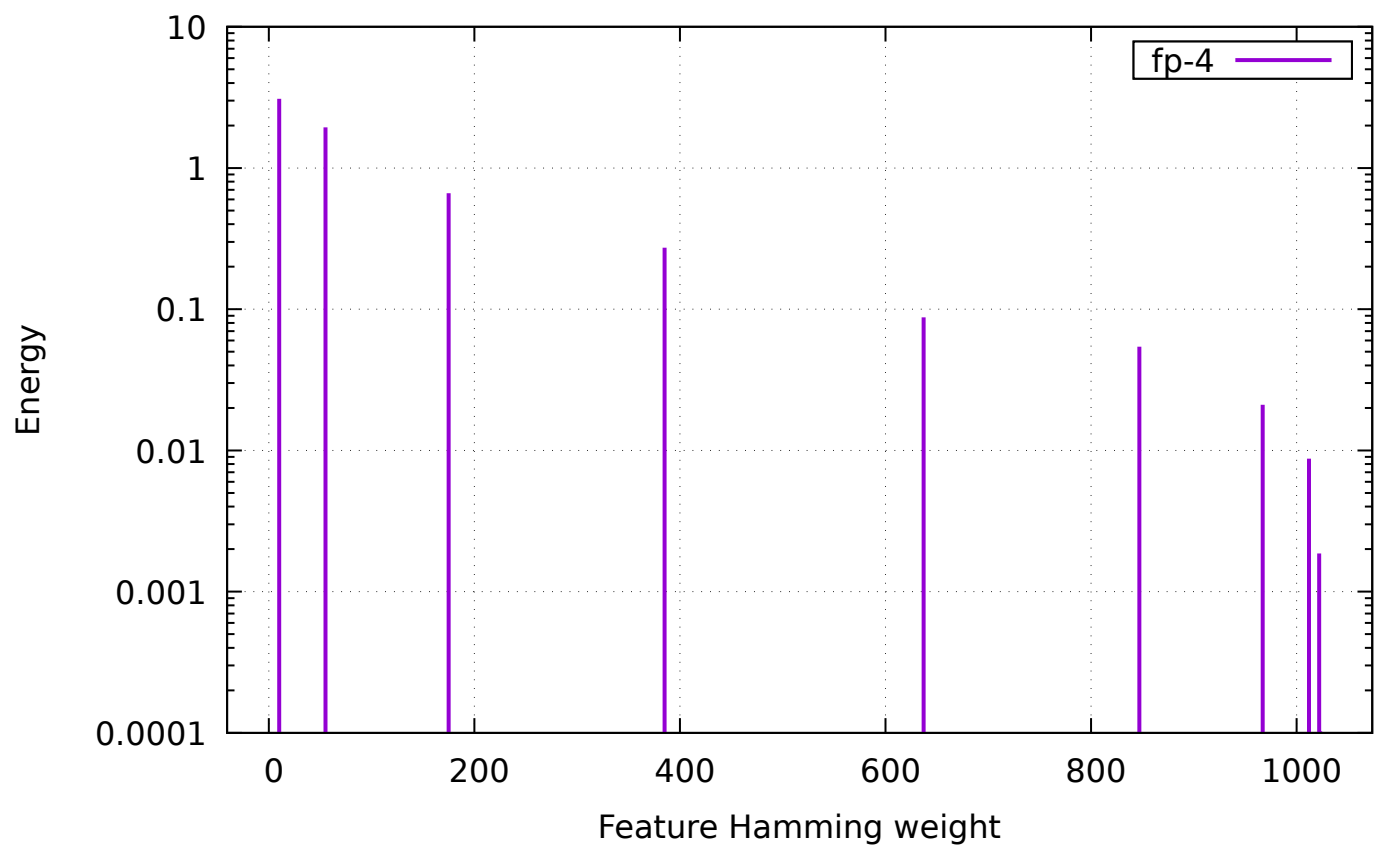
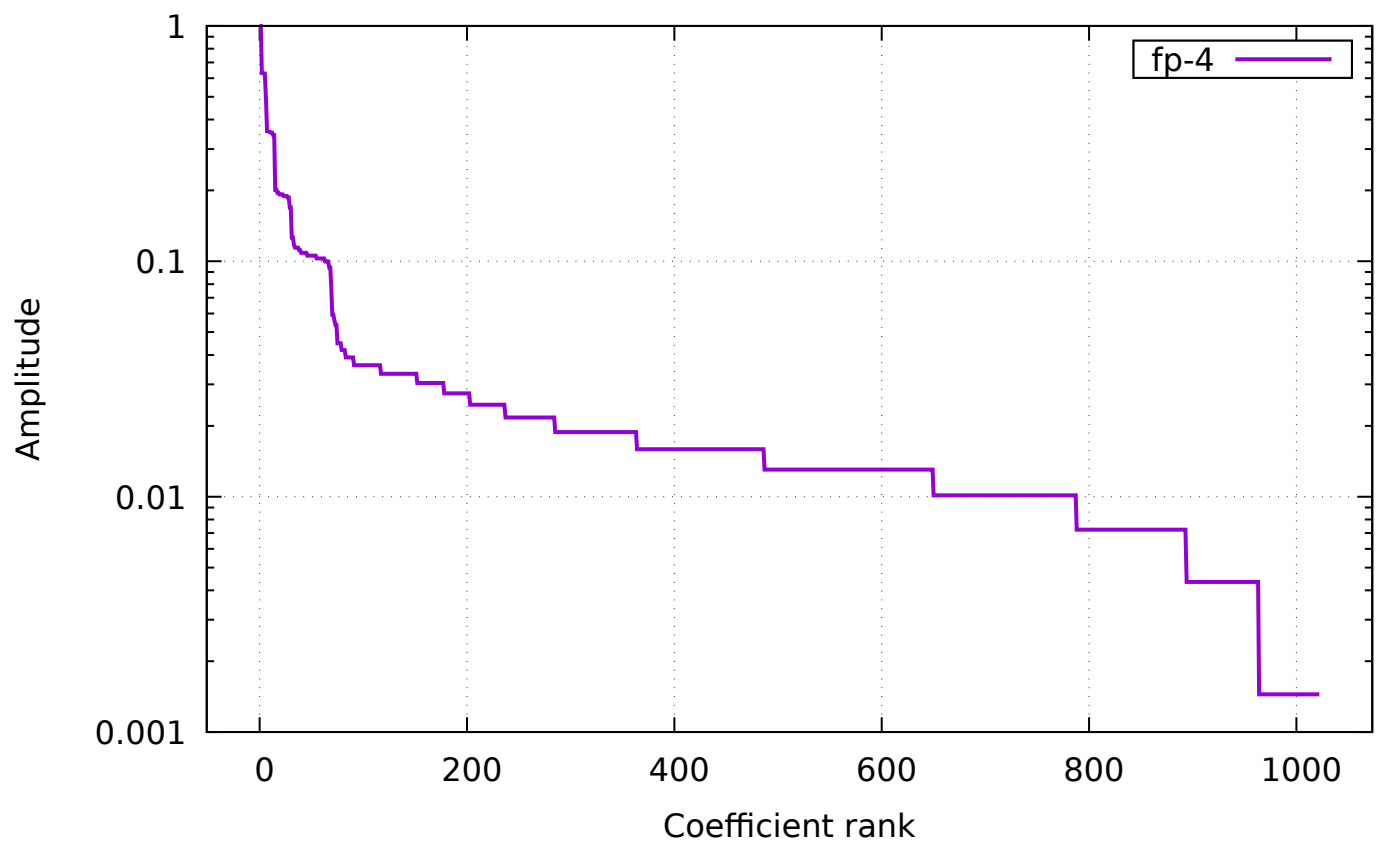
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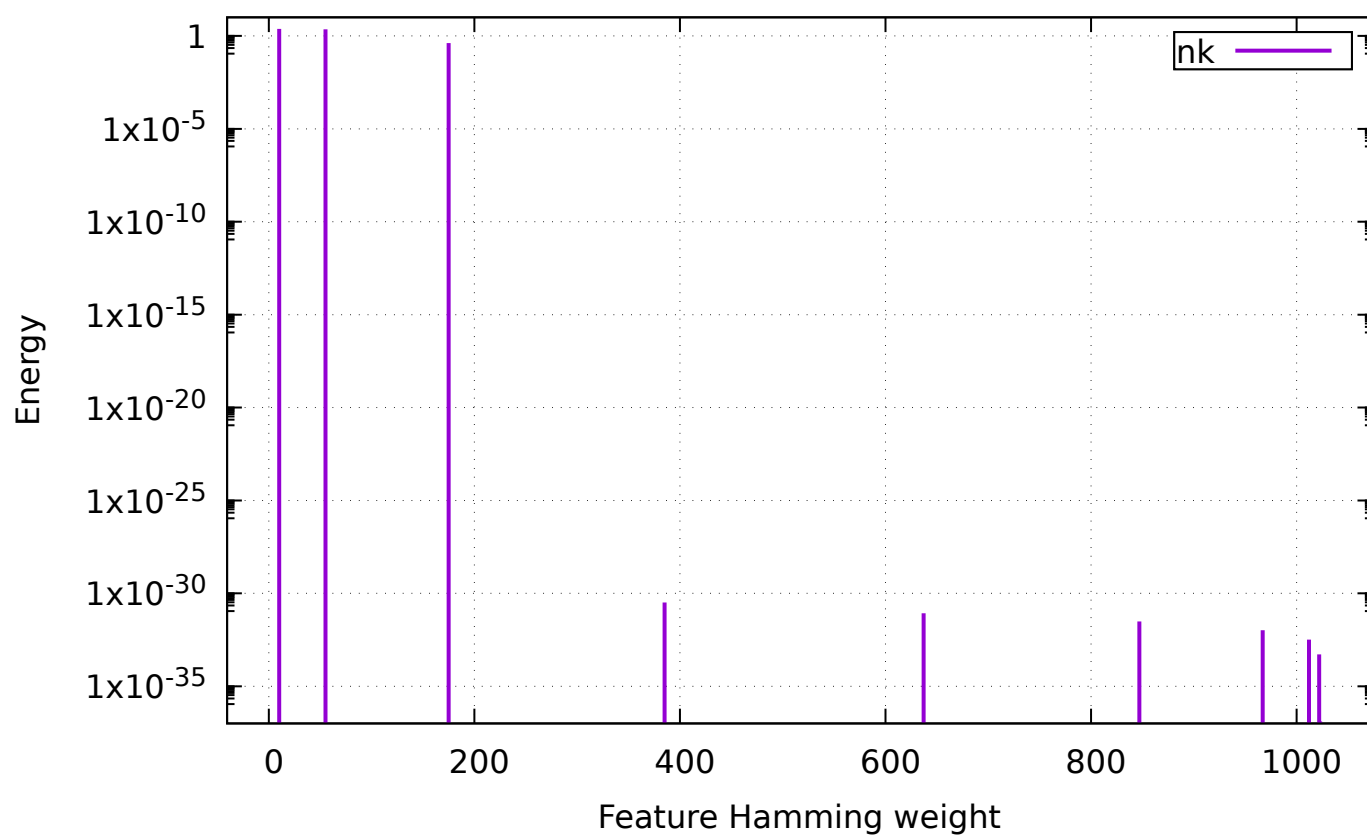
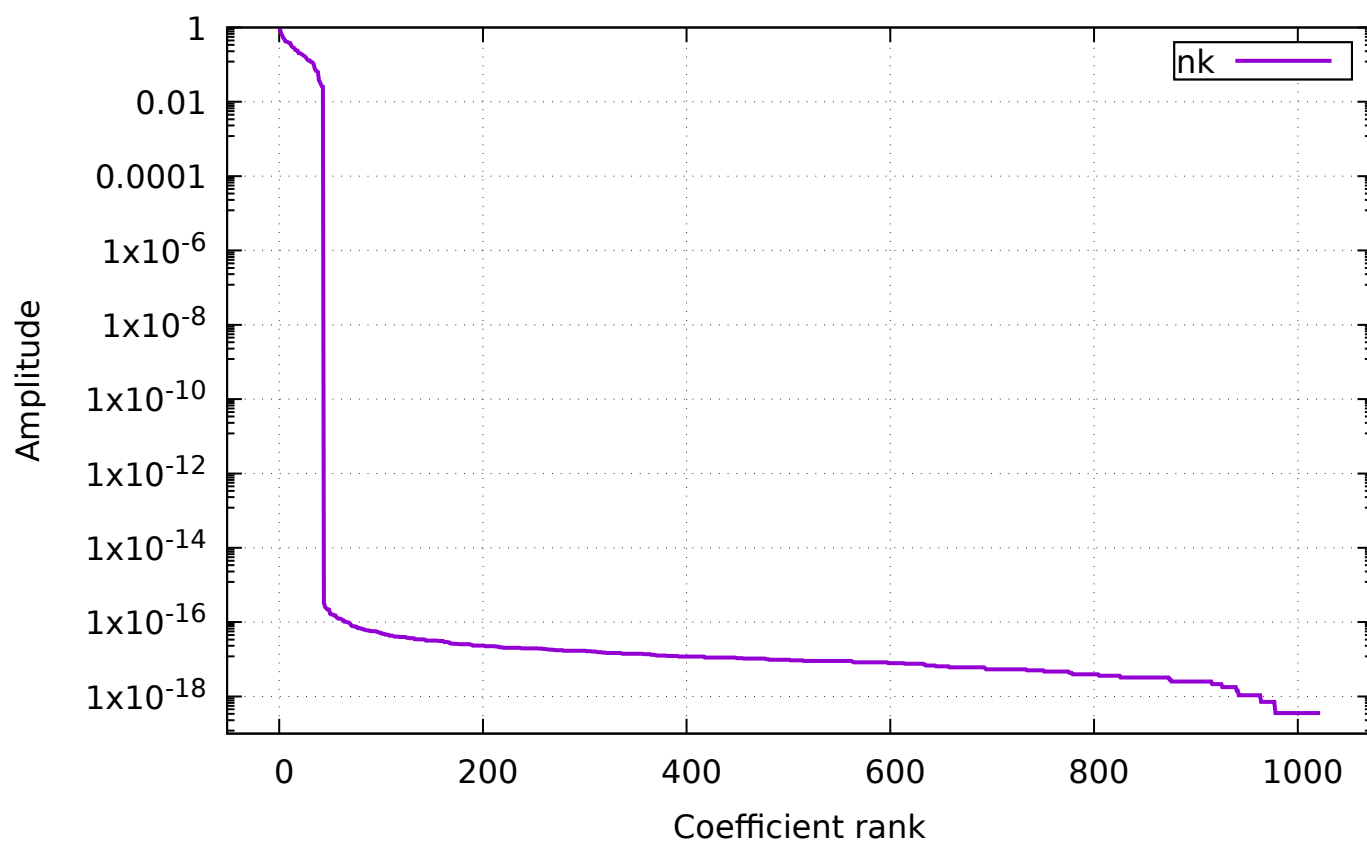


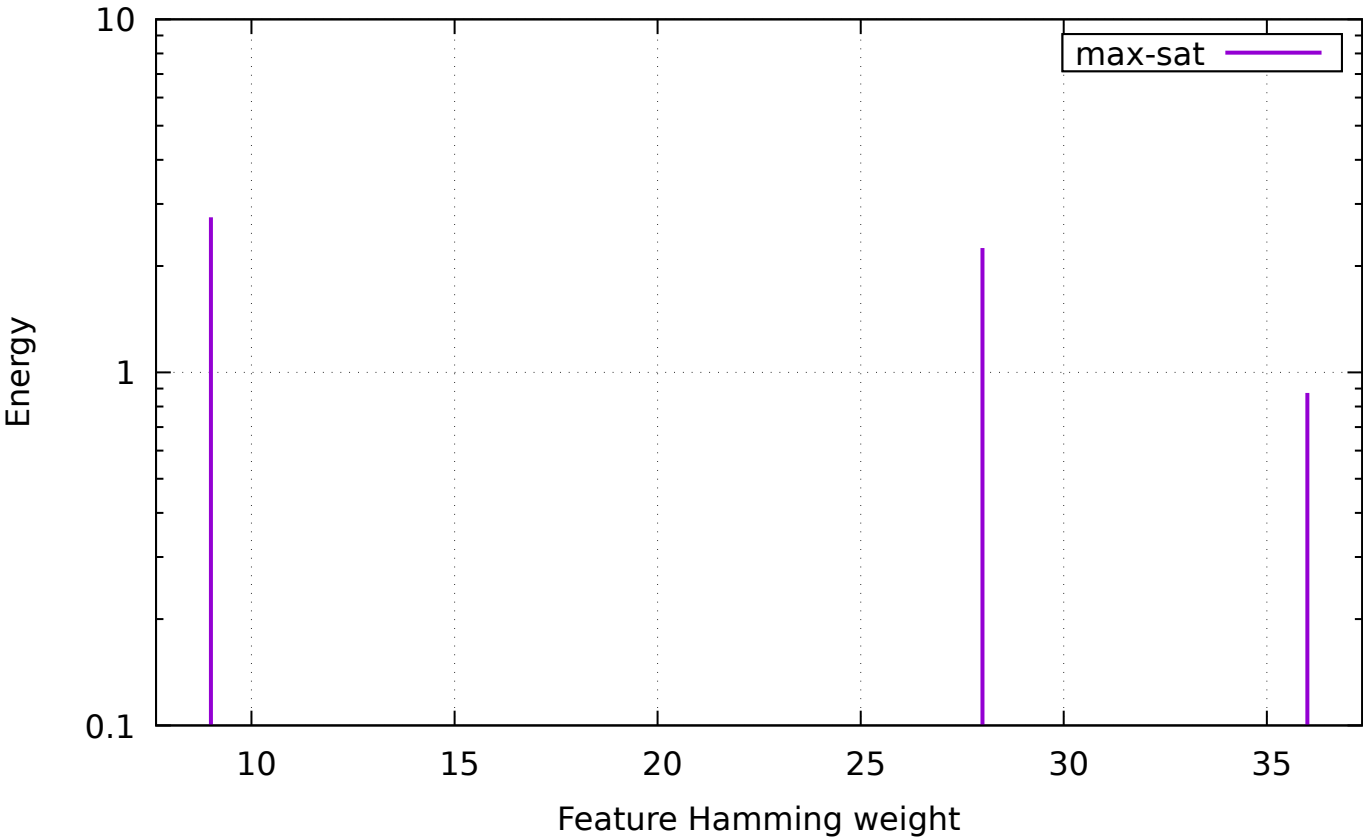
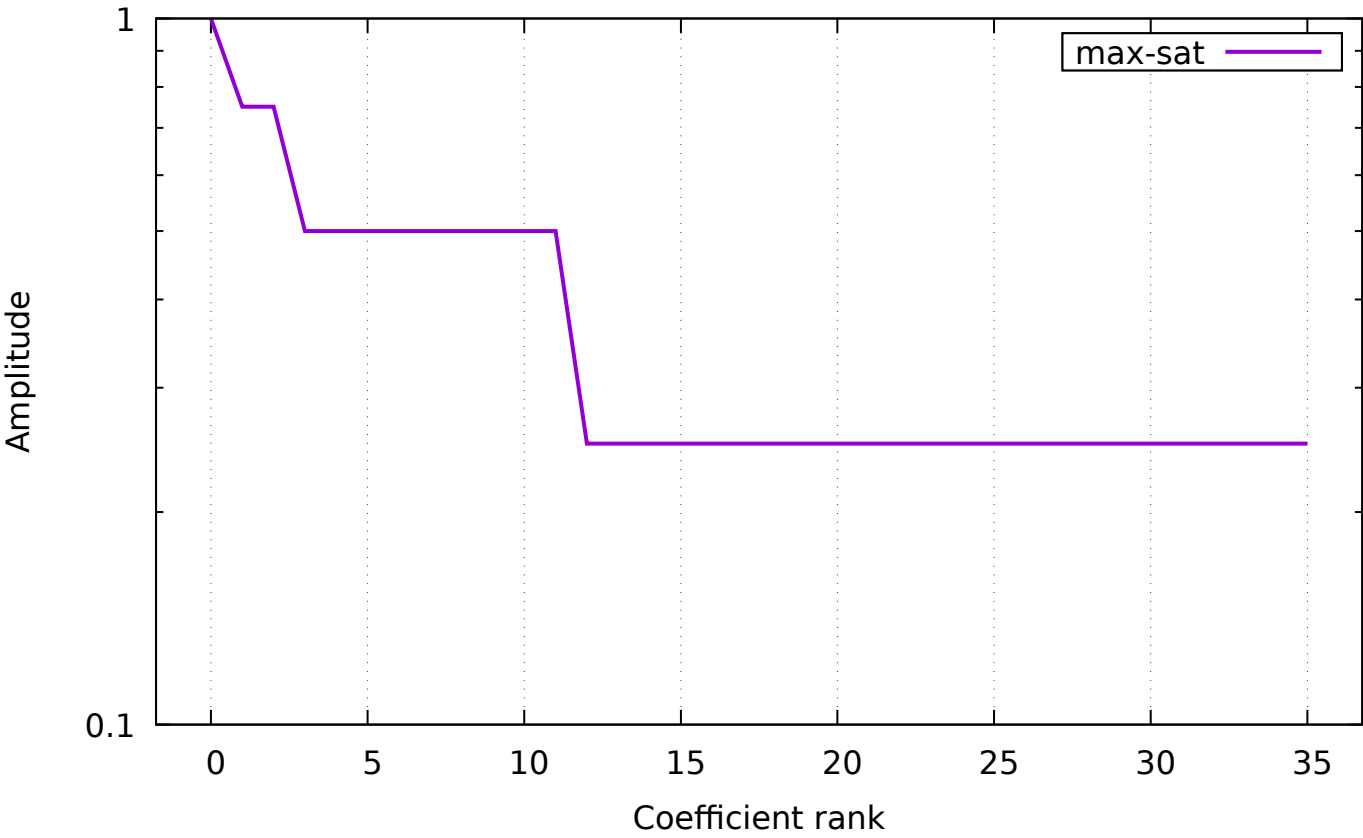
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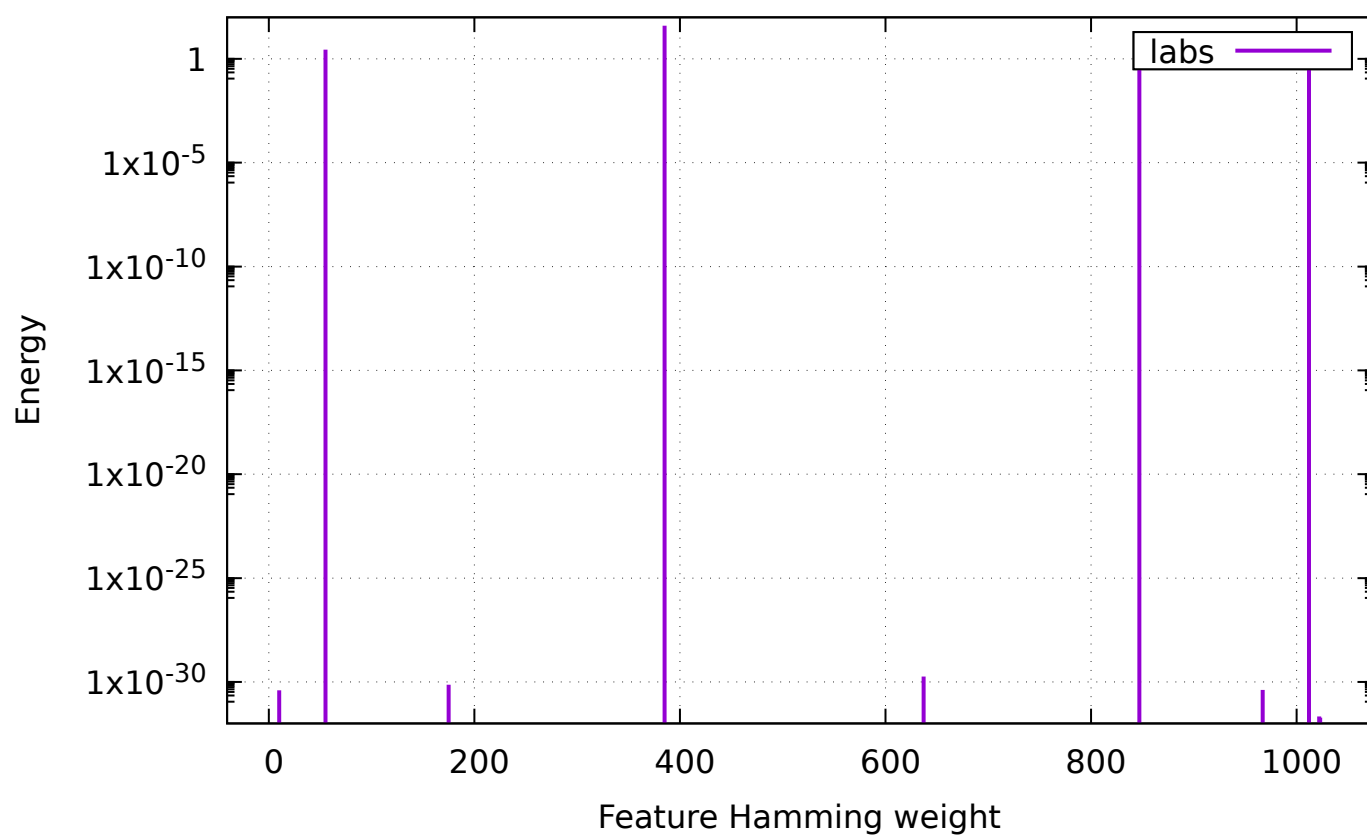
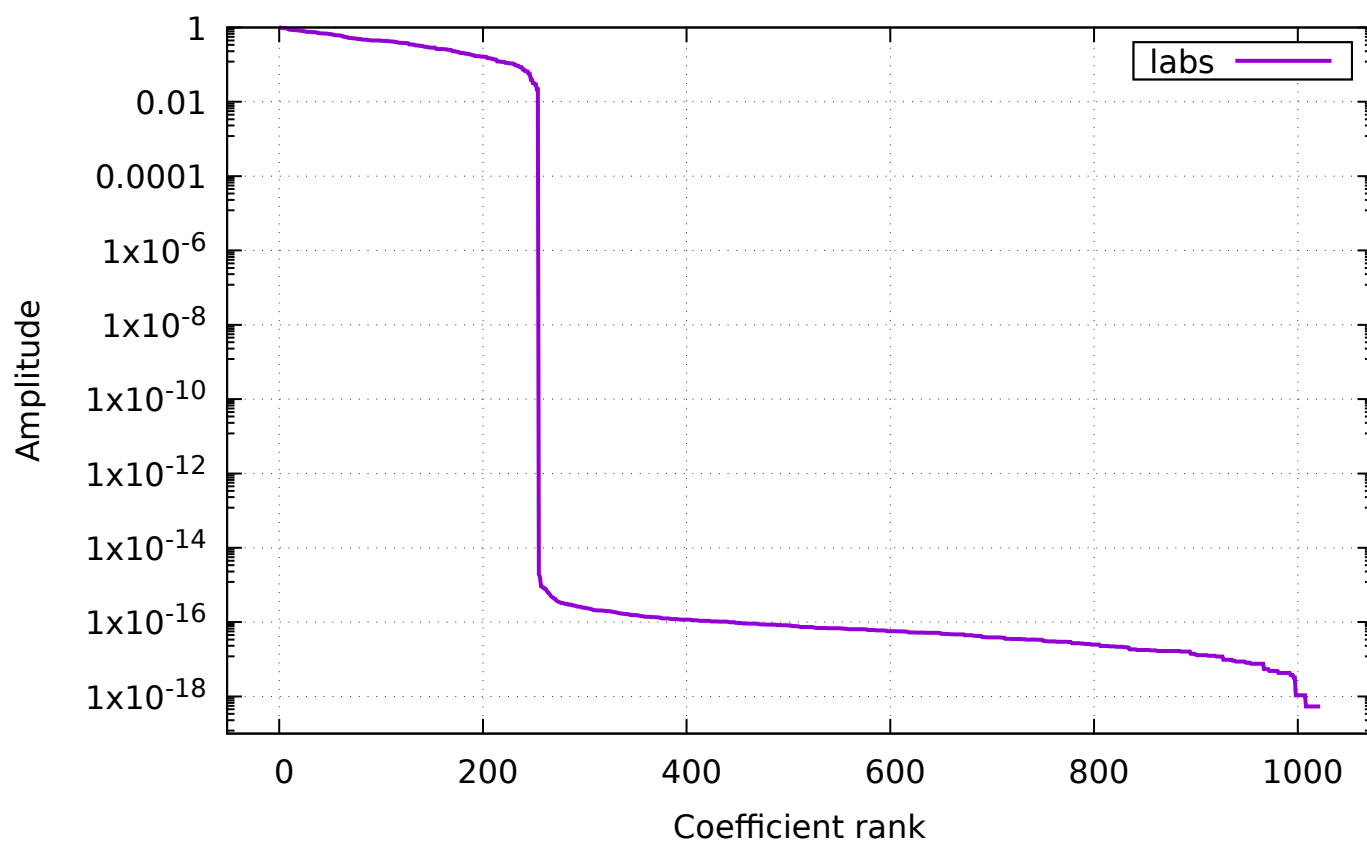






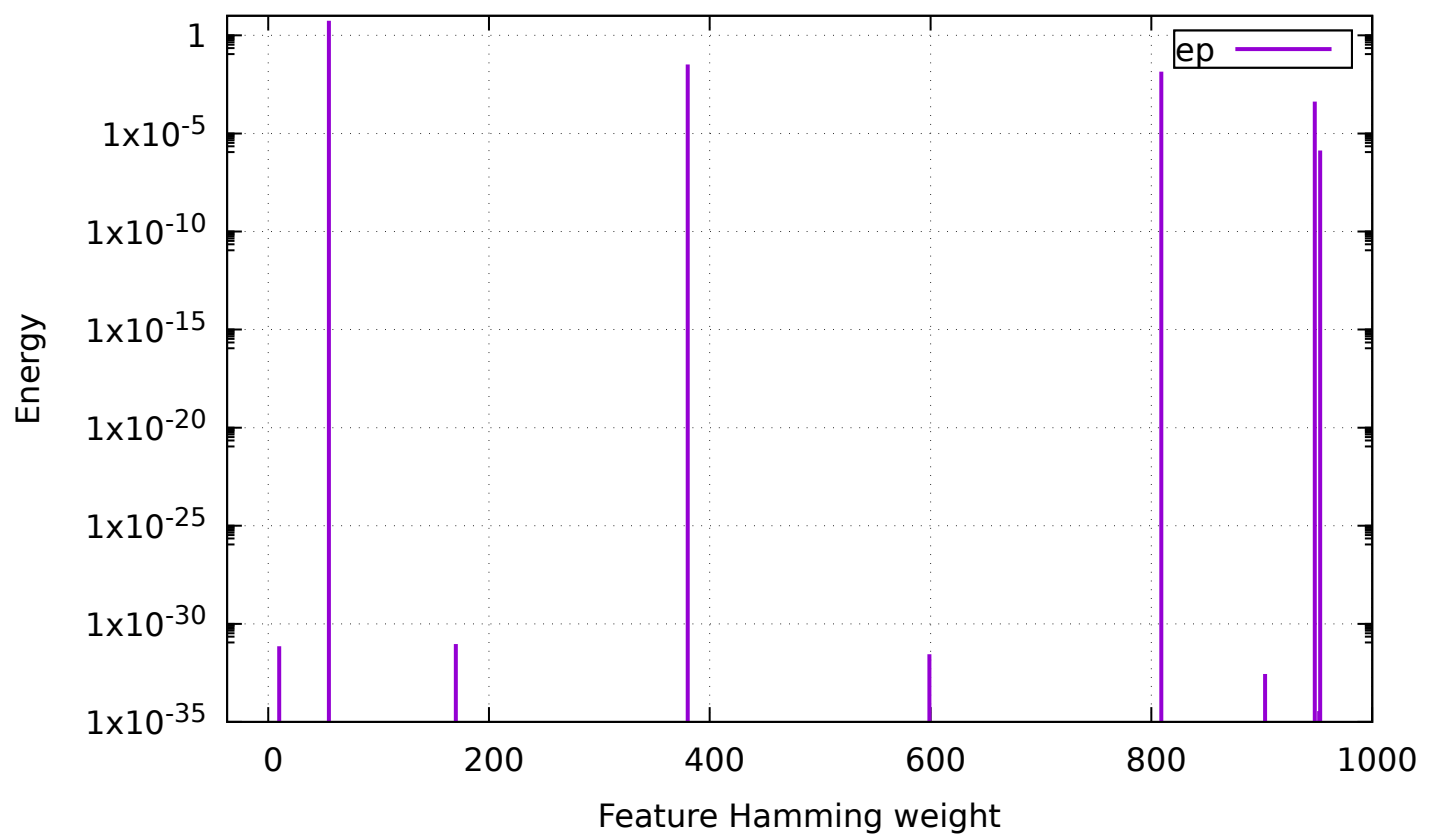
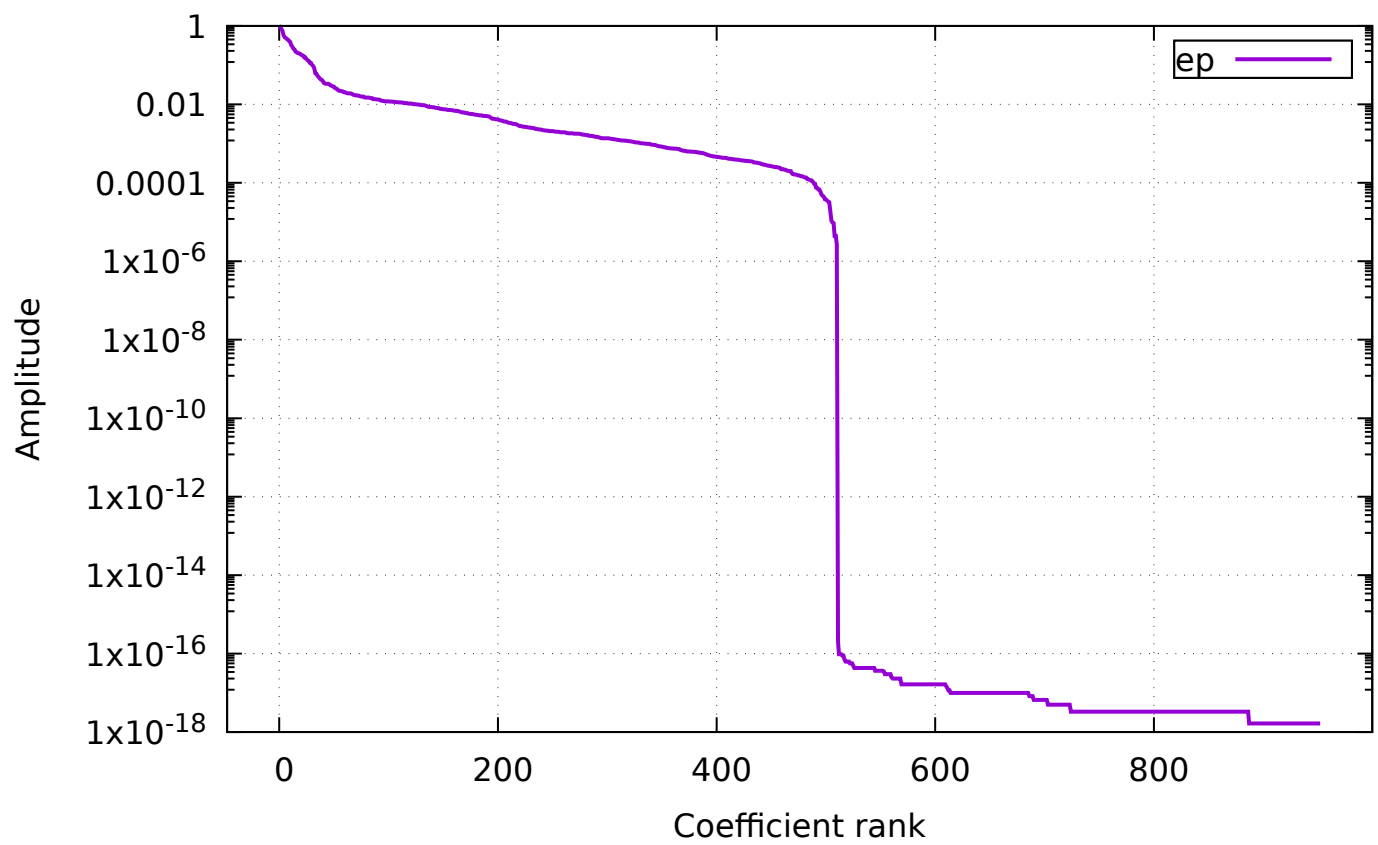




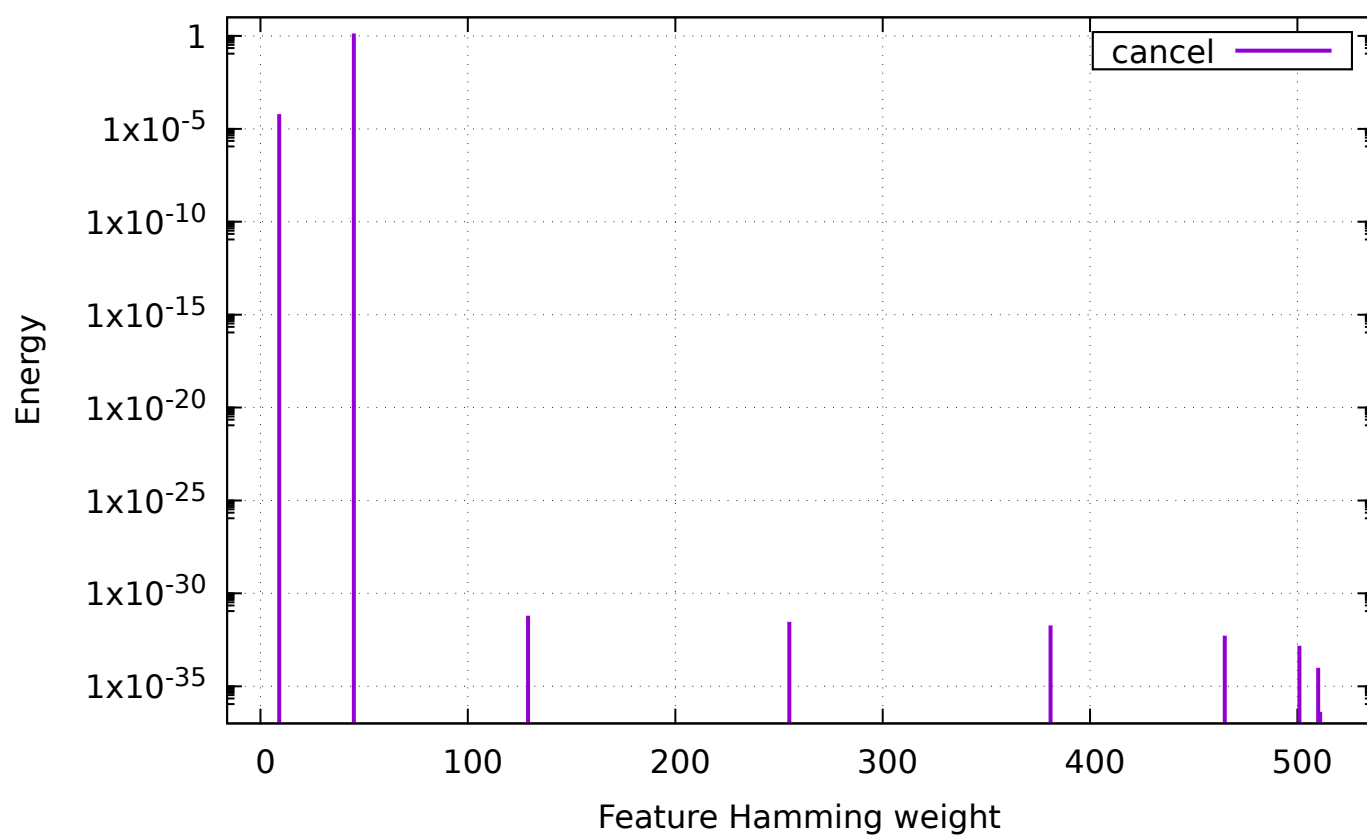
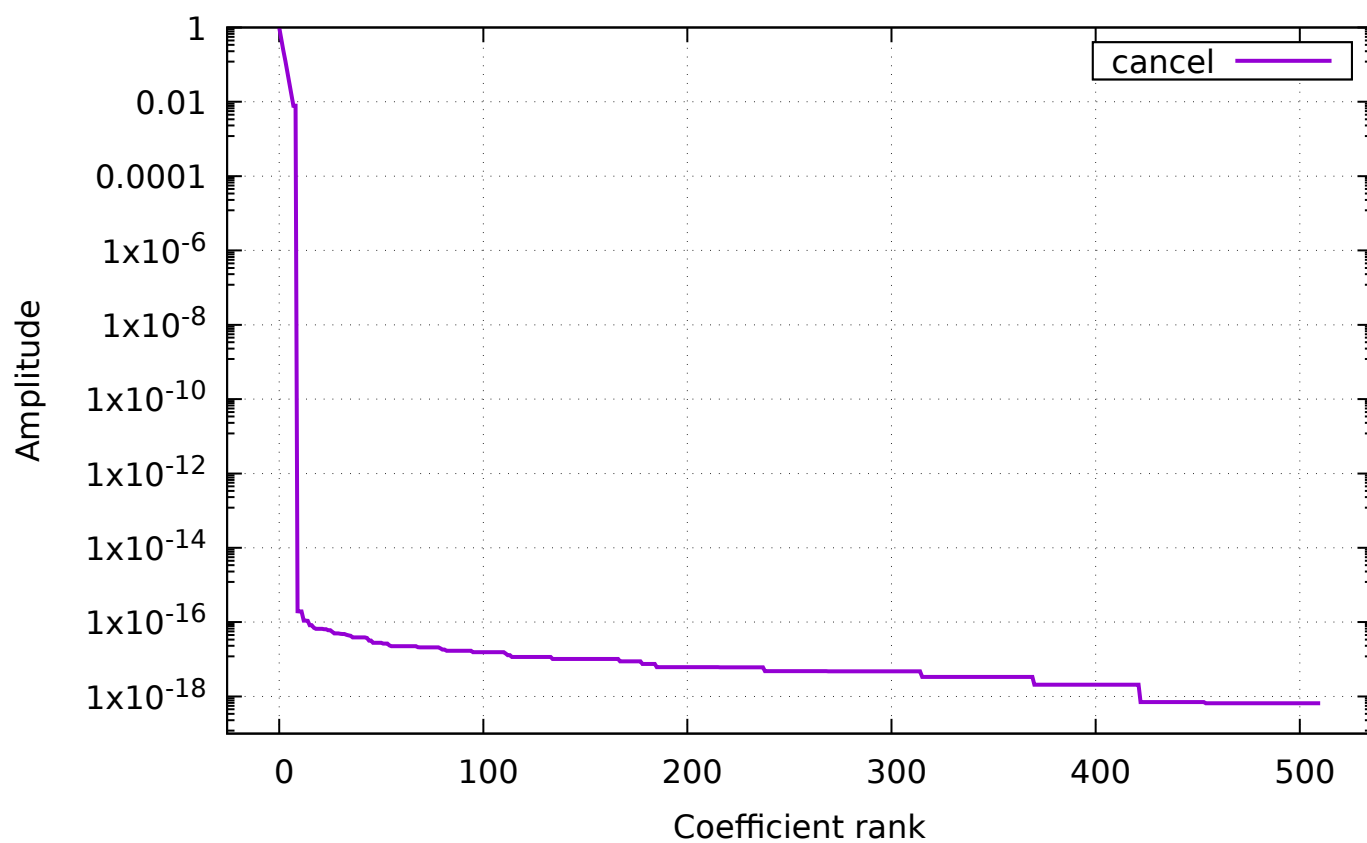




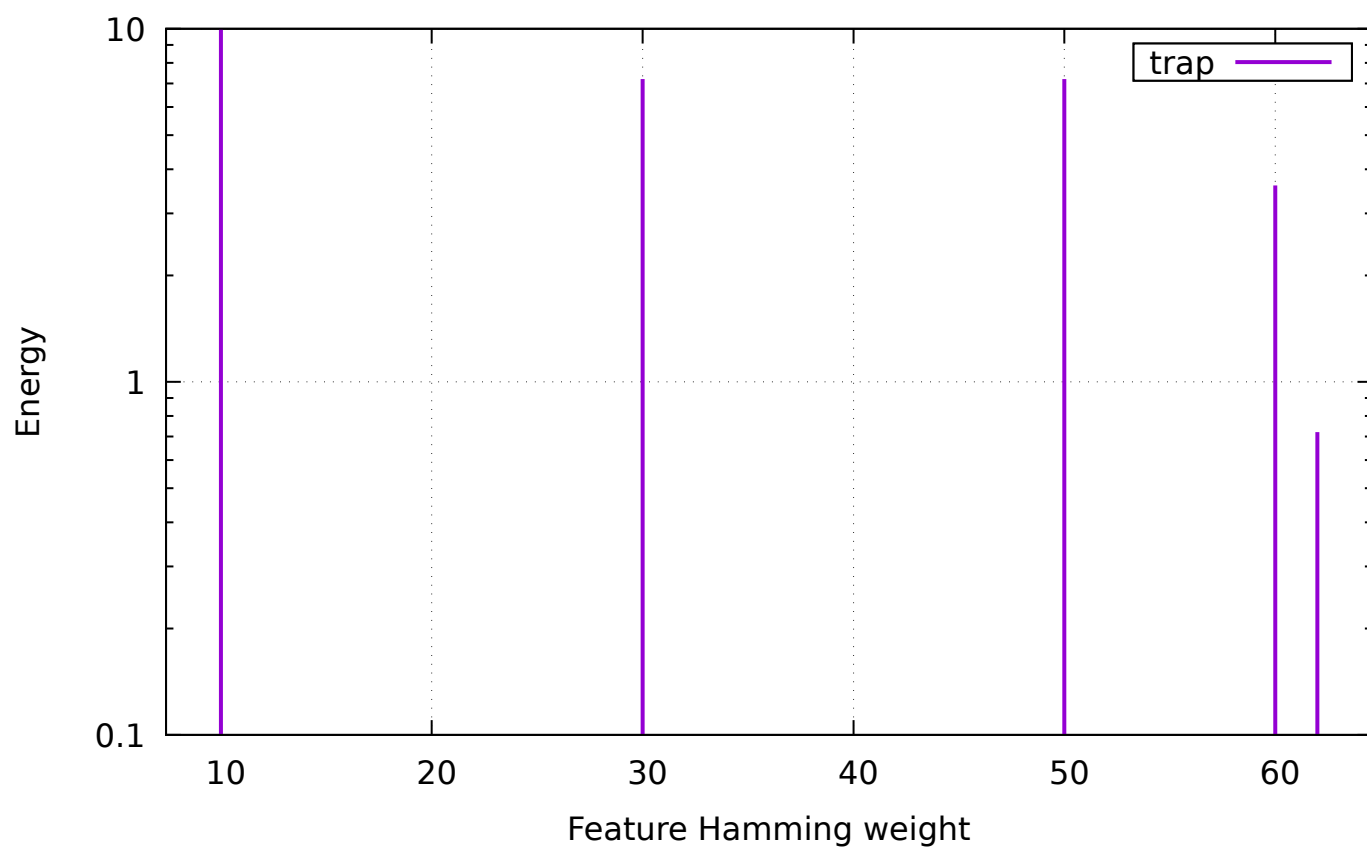
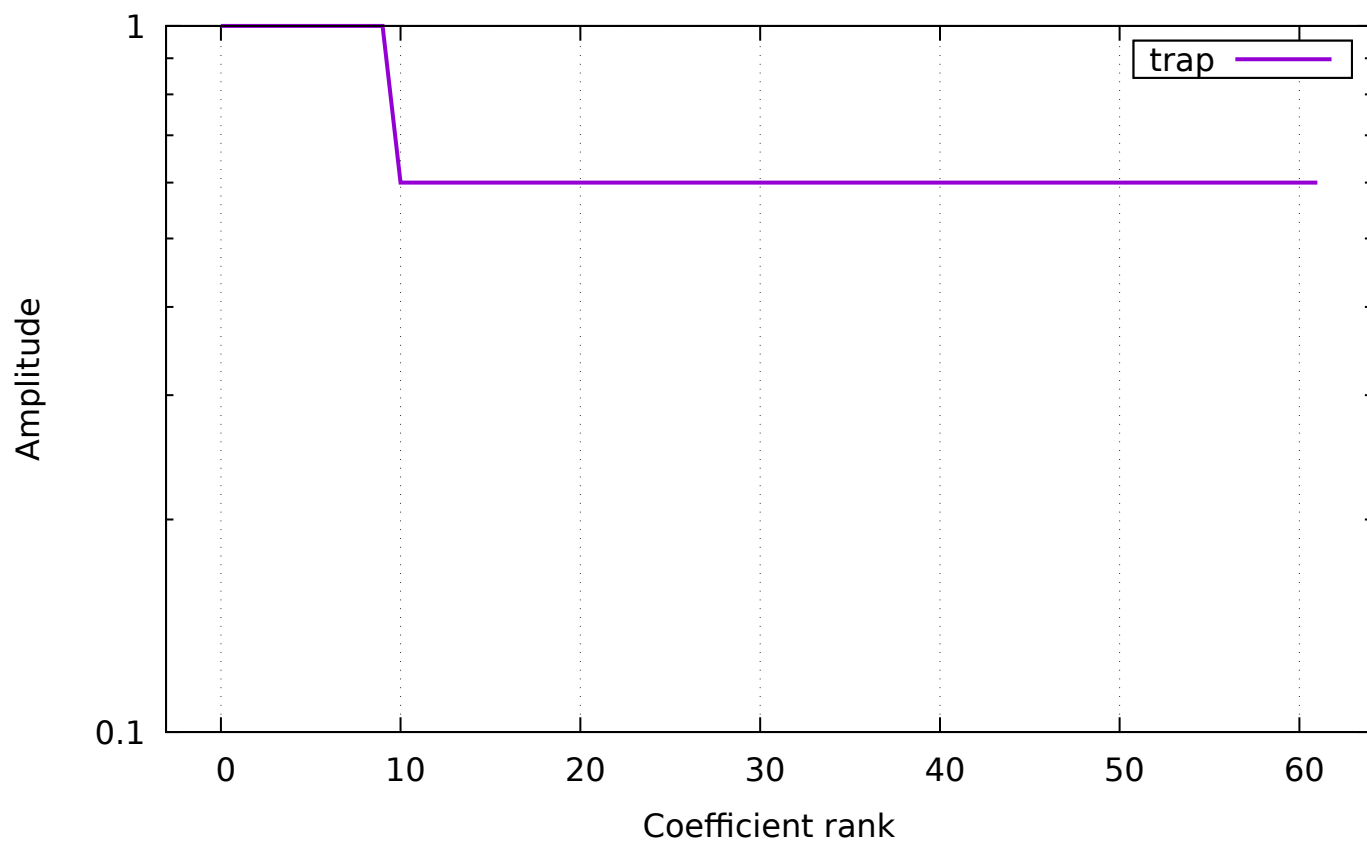
17 ep

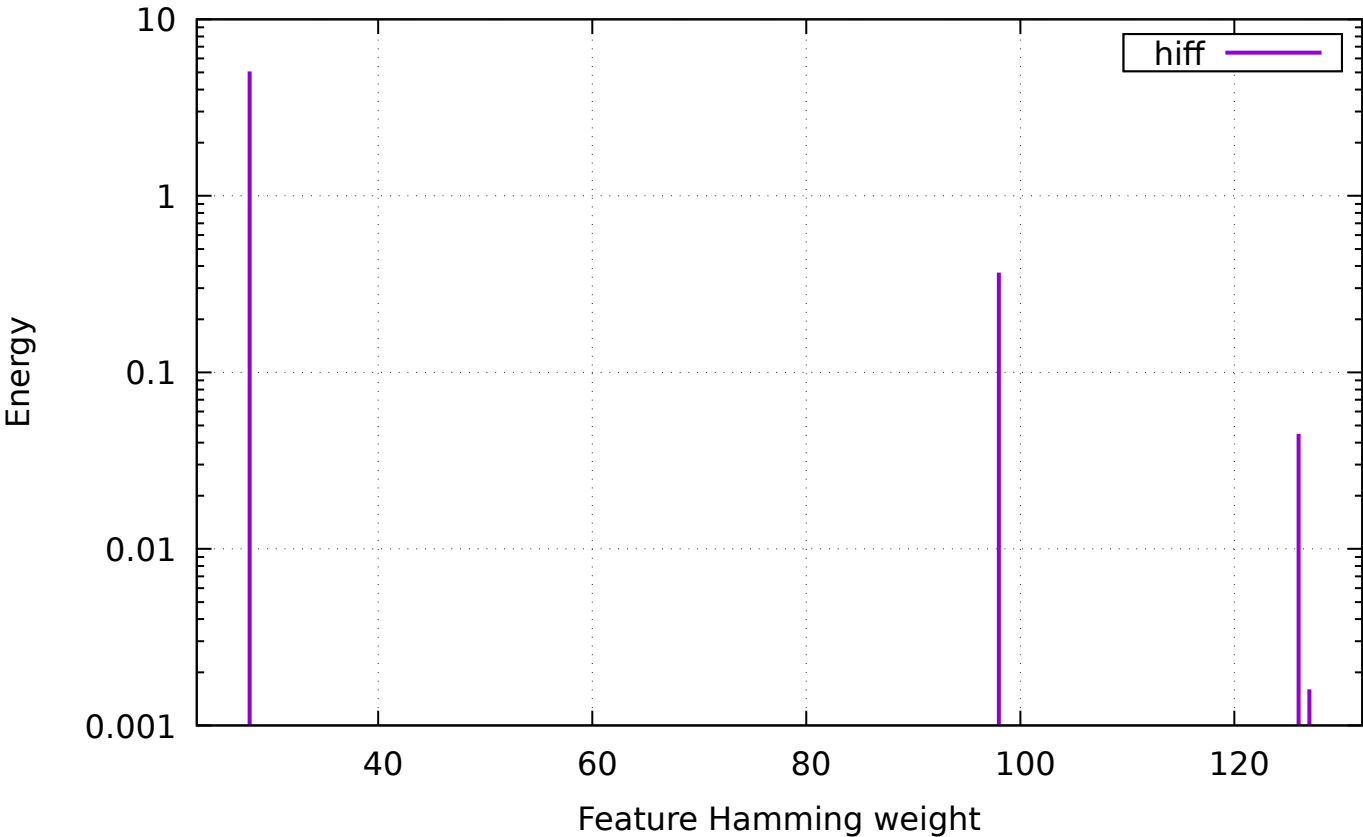
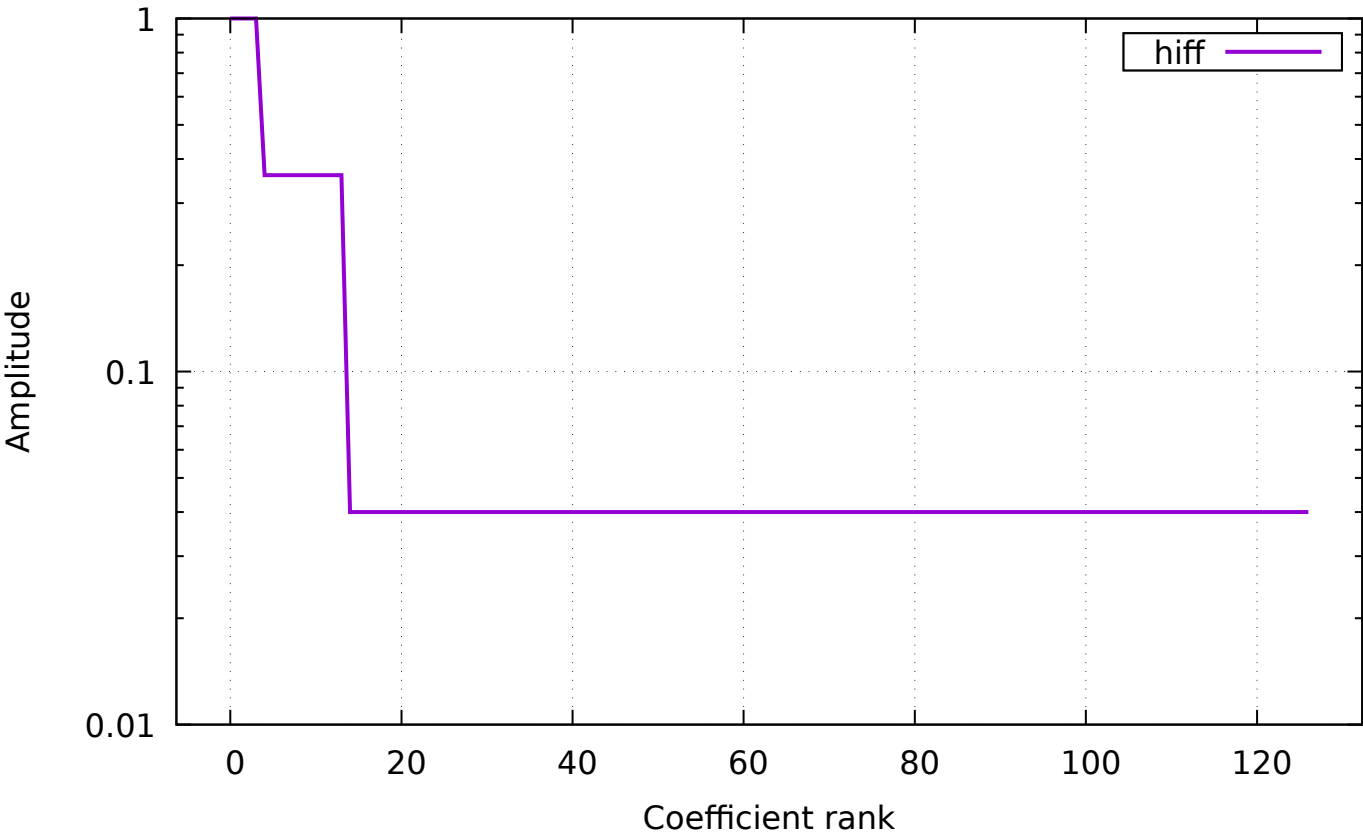


18 cancel

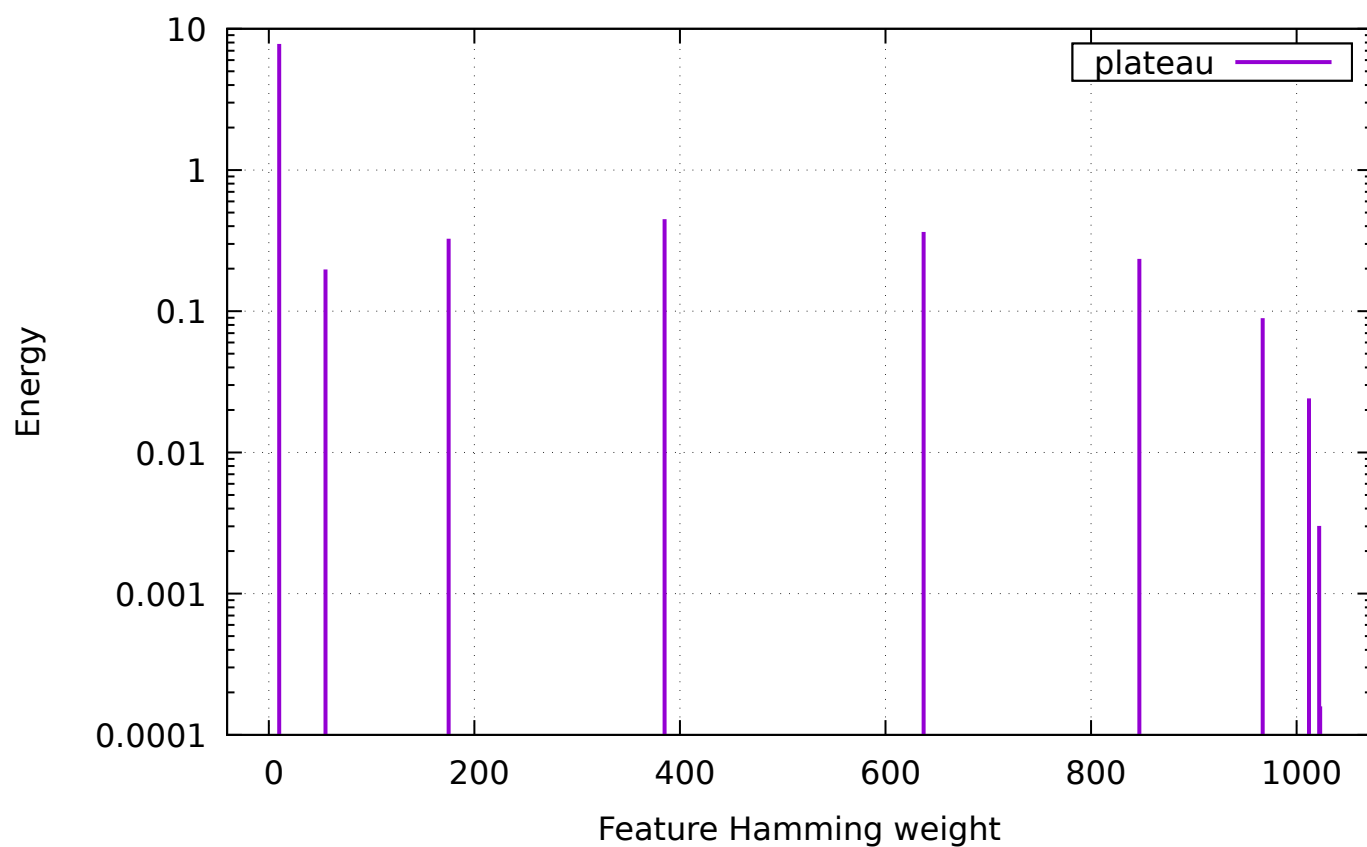
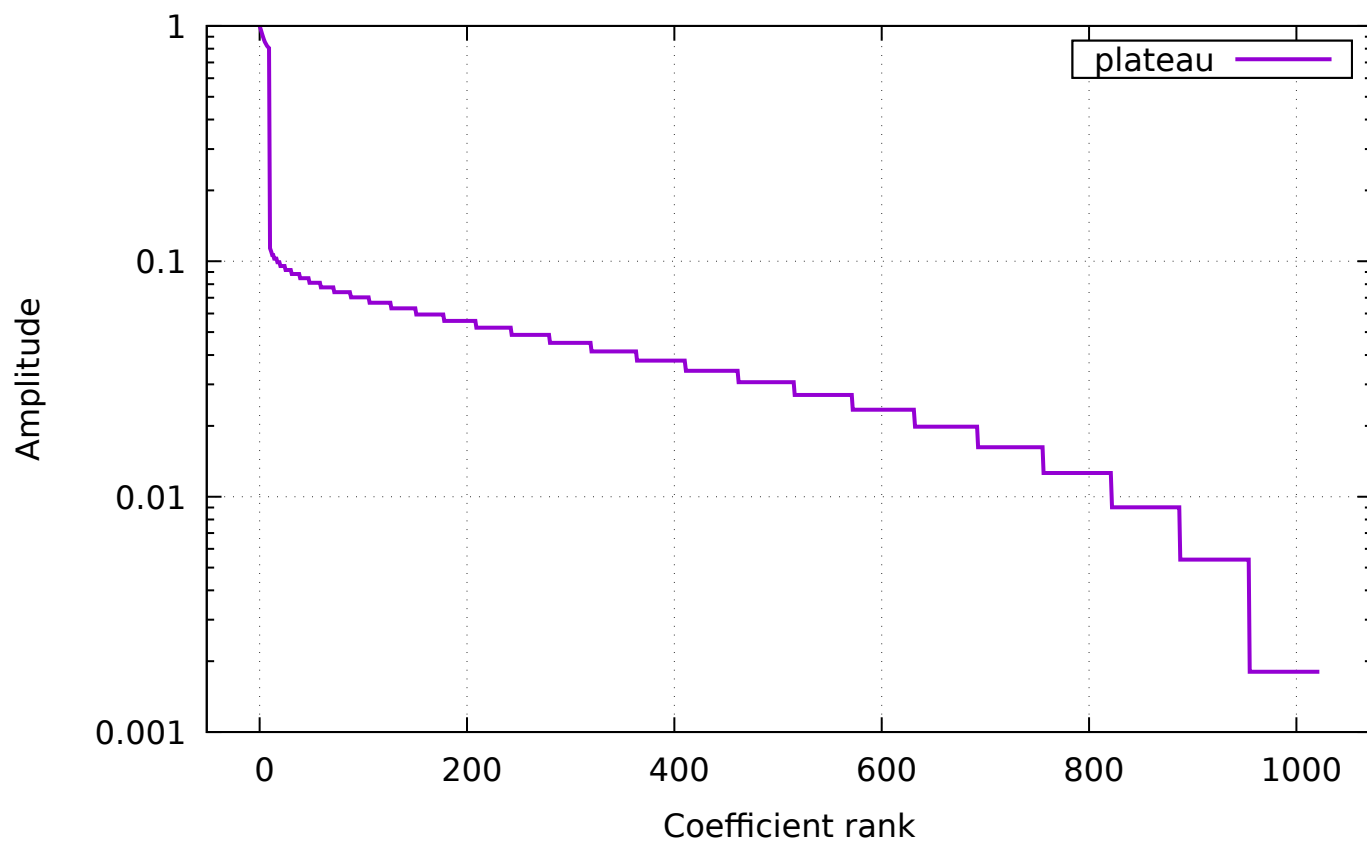


## 19 trap

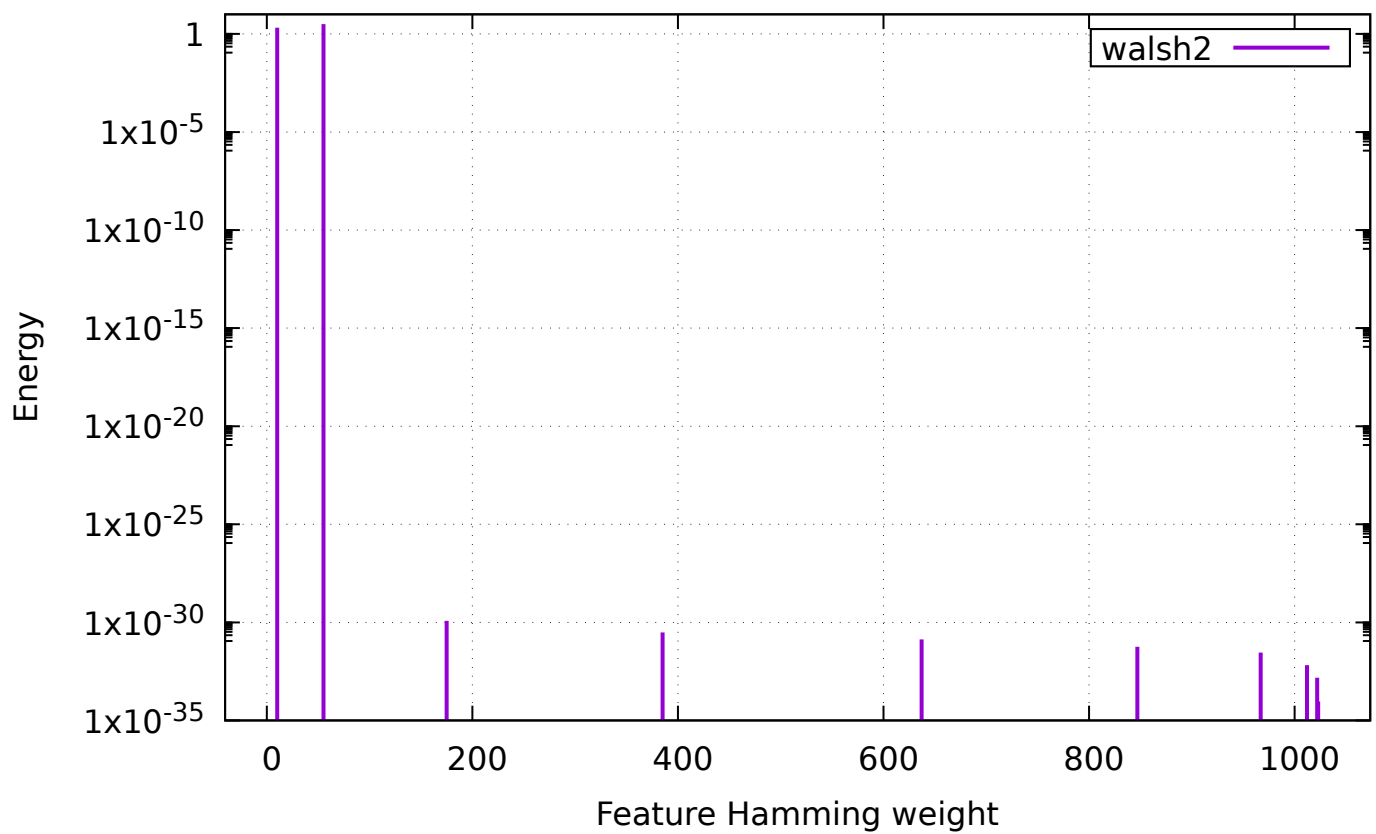
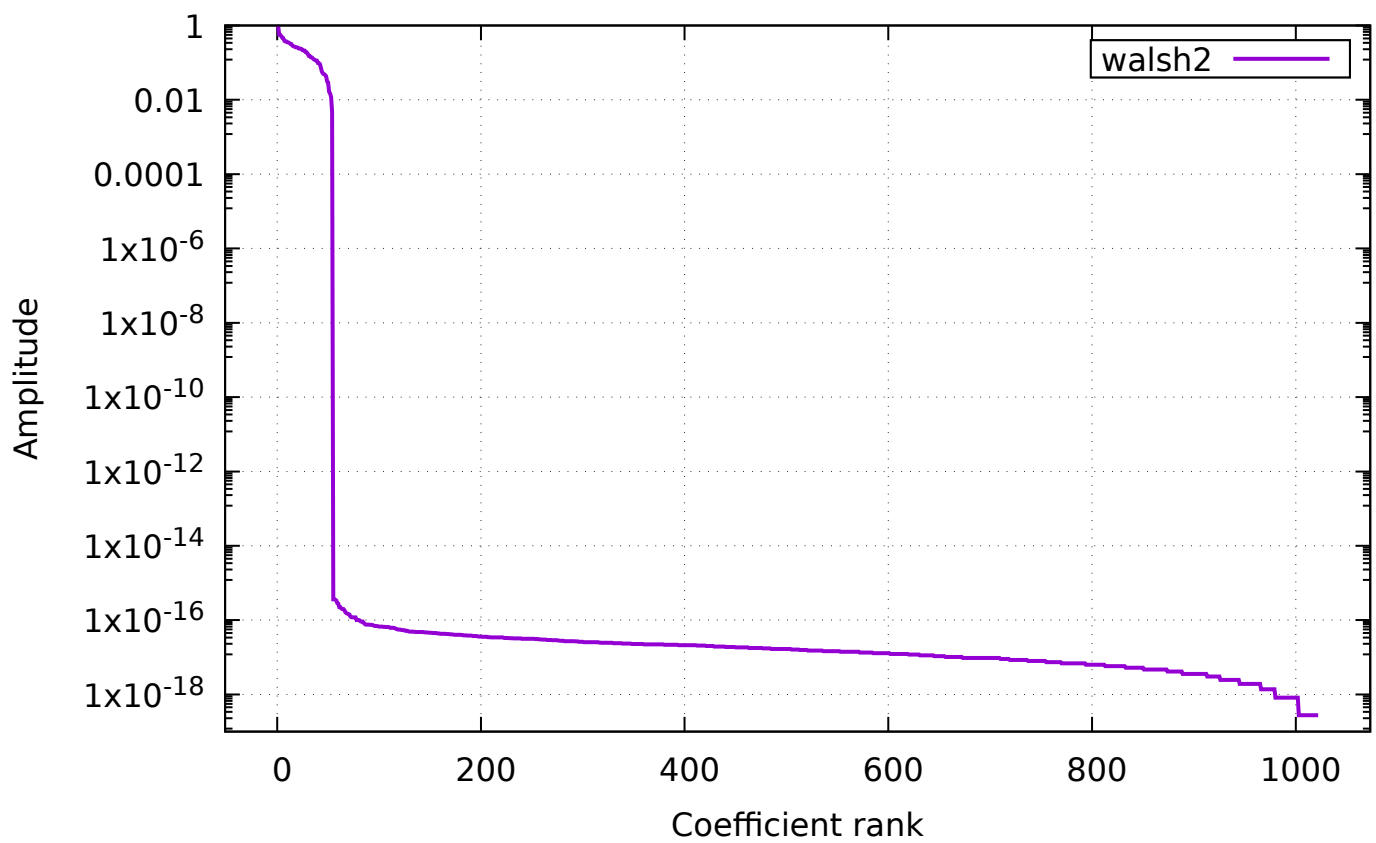




## 21 plateau



## 22 walsh2



## A Plan

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}
```

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  {
    "id": "leading-ones",
    "opt": "-F 10",
    "col": ">{\{\nprounddigits{0}\}\}N{3}{0}"
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  {
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  {
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    "col": ">{\{\nprounddigits{0}\}\}N{3}{0}"
  },
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```

```

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  },
  {
    "id": "hiff",
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    "col": ">{{\\nprouddigits{0}}}N{3}{0}"
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```



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        "opt": "-F 120 -s 8",
        "col": ">{\\nprouddigits{0}}N{3}{0}"
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    {
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        {
            "id": "nk",
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    ]
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```

```

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        "col": ">{\\nprounddigits{2}}N{3}{2}"
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]
}
]
}

```

## B Default parameters

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# algorithm = 100
# bm_mc_reset_strategy = 1
# bm_num_gs_cycles = 1
# bm_num_gs_steps = 100
# bm_sampling = 1
# budget = 10000
# bv_size = 100
# cache_budget = 0
# ea_lambda = 100
# ea_mu = 10
# fn_name = noname
# fn_num_traps = 10
# fn_prefix_length = 2
# fn_threshold = 10
# function = 0
# ga_crossover_bias = 0.5
# ga_crossover_probability = 0.5
# ga_tournament_size = 10
# hea_binary_dynamics = 0
# hea_delay = 10000
# hea_num_par_updates = 1
# hea_num_seq_updates = 100
# hea_rate_strategy = 0
# hea_reset_period = 0
# hea_sampling_method = 0
# hea_time_constant = 1000
# hea_weight = 1
# learning_rate = 0.001
# map = 0
# map_input_size = 100
# map_path = nopath
# mutation_probability = 1
# neighborhood = 0

```

```
# neighborhood_iterator = 0
# noise_stddev = 1
# num_iterations = 0
# num_threads = 1
# path = nopath
# pn_mutation_probability = 1
# pn_neighborhood = 0
# pn_radius = 2
# population_size = 10
# pv_log_num_components = 5
# radius = 2
# rls_patience = 50
# sa_beta_ratio = 1.2
# sa_initial_acceptance_probability = 0.6
# sa_num_transitions = 50
# sa_num_trials = 100
# seed = 0
# selection_size = 1
# target = 100
# print_defaults
# last_parameter
# exec_name = hnco
# version = 0.9
# Generated from hnco.json
```