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Addendum: Search for resonant and nonresonant production of pairs of dijet resonances in proton-proton collisions at $\sqrt{s} = 13$ TeV



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We extend the analysis with a search for models with resonant production of a pair of dijet resonances via a broad mediator. This is the first time a search for a broad four-jet resonance decaying into a pair of BSM particles is performed at a hadron collider. The natural width of mediator Y is considered here to be comparable to or larger than the experimental resolution, thus forming a broad resonance. In contrast, the dijet resonance X is characterized by a narrow intrinsic width to avoid large couplings, which are already excluded by dijet resonance searches for single X production [1, 2]. The event selection, jet pairing algorithm, and fitting approach are the same as those utilized for the narrow-resonance interpretation, since they remain optimal for a broad-resonance search, and potential biases are avoided in light of the significant excess of high-mass events already reported in the analysis.

This extension is further motivated by the presence of a third high-mass isolated event with $m_{4j} = 5.8$ TeV and $\overline{m}_{jj} = 2.0$ TeV, in addition to the two events observed at $m_{4j} = 8$ TeV and $\overline{m}_{jj} = 2$ TeV. The similar values of $\overline{m}_{jj}$ of these events, all around 2 TeV, and

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the wider spread of the observed m_{4j}, make them potential candidates for a broad four-jet resonance decaying into a pair of narrow dijet resonances.

Resonances decaying to pairs of dijet resonances arise in models of diquark particles decaying into vector-like quarks [3–6] or into colored-triplet scalars [5], in extensions of the QCD gauge group [3, 7], in supersymmetric scenarios with a single baryon-number and R-parity violating term [8], or in other theoretical frameworks [9].

As benchmarks, we consider two models of scalar diquark particles [3], where a color-sextet diquark, $\mathrm{S_{uu}}$ or $\mathrm{S_{dd}}$, is produced from the annihilation of two up or down quarks. The dijet resonance is a vector-like quark, χ or ω, that decays at one loop into a gluon and an up or down quark, respectively. Here, in addition to searching for broad resonances decaying to pairs of dijet resonances, we also for the first time use and explicitly constrain the $\mathrm{S_{dd}}$ model. The $\mathrm{S_{dd}}$ model has signal shapes and acceptance identical to those of $\mathrm{S_{uu}}$, but a significantly lower production cross section, since the probability of finding a d quark in the proton is substantially smaller than that of a u quark at large fractional momenta.

Events are generated for diquark masses between 2 and 10 TeV and for vector-like quark masses between 0.22 and 4.2 TeV. The vector-like quarks have a width-to-mass ratio smaller than 10^{-4}, because their decays arise at one loop [4]. For each $\alpha_{\mathrm{true}} = M_\chi/M_\mathrm{S}$ signal scenario, the couplings y_{uu} and y_χ are chosen accordingly so as to generate diquark resonances with a total natural width of 1.5, 5, and 10%, while keeping $\beta = y_{uu}/y_\chi$ at its benchmark value of 2/3. High-mass diquark signals with a width larger than approximately 10% do not exhibit a clear peak at the resonance mass, and hence are outside the scope of this analysis. We set $\mathcal{B}(\chi \to \mathrm{ug}) = 1$, as is done in ref. [3]. The above discussion of couplings, widths, and our benchmark values is also true for $\mathrm{S_{dd}}$ and ω with the symbolic replacement everywhere of $\mathrm{u} \to \mathrm{d}$ and $\chi \to \omega$.

Figure 1 (left) shows the shapes of signals with $\alpha_{\mathrm{true}} = 0.25$ and various diquark masses, for $\alpha > 0.1$. Low-mass resonances exhibit a shift toward higher m_{4j} as their natural width increases, whereas intermediate-mass resonances display a broader distribution extending to both lower and higher m_{4j}. Conversely, high-mass resonances present a long, low-mass tail, arising from the convolution of the resonance production with the parton distribution functions (PDFs). At high masses, the PDFs fall steeply with momentum fraction, increasing the probability that one or both partons have relatively low momentum, thus enhancing the low-mass tail. This effect becomes more prominent with larger natural width and larger resonance mass. Overall, a broad resonance gives an improved description of all three candidate events with $\overline{m}_{jj} \simeq 2\,\mathrm{TeV}$.

The products of acceptance (A) and efficiency of the mass selection (ε) are shown in figure 1 (right), as functions of diquark mass for all widths considered. The $m_{4j} > 1.6\,\mathrm{TeV}$ requirement causes $A\varepsilon$ to decrease at a four-jet resonance mass of 2 TeV. A decrease in $A\varepsilon$ is observed at the highest values of M_S, which is enhanced as the diquark width increases, and is found to originate from the mass asymmetry and ΔR requirements on the dijet pairs.

The background-only fits in each α bin were previously shown to adequately describe the data, with a combined p-value of 0.18 for a simultaneous fit across all thirteen α bins. In the present analysis, the signal-plus-background modeling was likewise examined, with goodness-of-fit p-values ranging from 0.18 to 0.35 across all broad resonance signal hypotheses.

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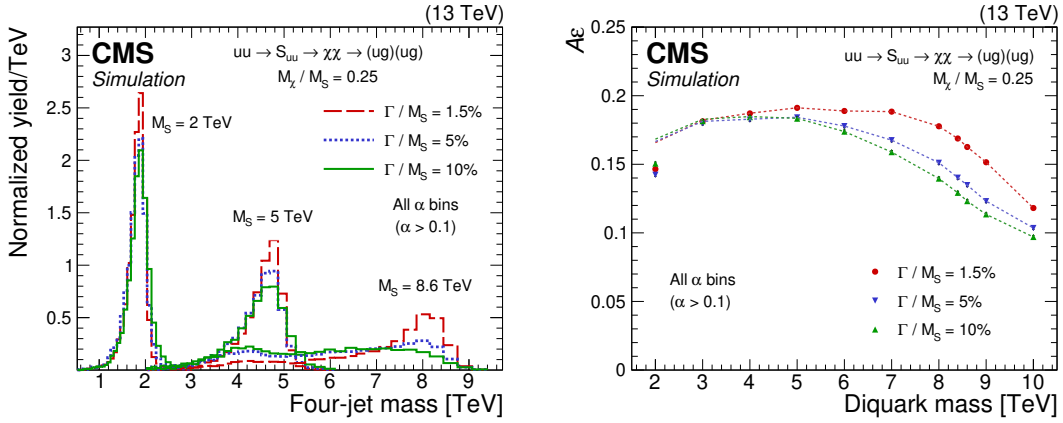


Figure 1. (Left) Signal differential distributions as a function of m_{4j} for $\alpha_{\text{true}} = 0.25$, diquark masses of 2, 5, 8.6 TeV, and various widths, for $\alpha > 0.1$. The integral of each distribution has been normalized to unity. (Right) The product of the acceptance (A) and efficiency of the mass selection (ε) for a resonant signal with $\alpha_{\text{true}} = 0.25$, shown with filled markers as a function of the diquark mass and for various diquark widths, for $\alpha > 0.1$. The case when $\varepsilon = 1$ is also shown as dashed lines.

The statistical treatment and systematic uncertainties for signal extraction are identical to those of the narrow four-jet resonance analysis. The background systematic uncertainties increase as the resonance width increases, an effect that is more prominent at higher resonance masses above approximately 7 TeV, where signal shapes are more affected by an increasing width, as seen in figure 1 (left). Bias studies were performed using pseudo-experiments, generated under several different signal hypotheses covering all considered widths, confirming that any bias in the signal extraction is negligible, even for the larger widths examined.

The upper limits at 95% CL for the largest width considered in the analysis are shown in figure 2, for thirteen values of α_{true} chosen at the center of each bin of α. Exclusion mass limits for S_{uu} and S_{dd} signals with $\alpha_{\text{true}} = 0.25$ are presented in table 1. For the 8.6 TeV four-jet resonance with a width of 10%, the benchmark S_{uu} diquark model is excluded, while the S_{dd} diquark model remains viable and compatible with the three candidate events.

Figure 3 (left) shows the local p-value of a signal, evaluated under the background-only hypothesis, as a function of the four-jet resonance mass and width for $\alpha_{\text{true}} = 0.25$. For a width of 1.5%, the most significant signal hypothesis occurs at a four-jet resonance mass of 8.6 TeV and a dijet resonance mass of 2.15 TeV, for which the local significance is 3.9 s.d., the same as the significance observed for a narrow resonance with those mass values. As the four-jet resonance becomes broader, figure 3 demonstrates that the local significance remains high, exceeding or being equal to 3.6 s.d., even for the largest width of 10%. Hence, the significance of an 8.6 TeV four-jet resonance is found to be relatively insensitive to the width, making a broad resonance an equally valid interpretation of the excess.

Table 2 summarizes the local and global significances for a four-jet resonance, along with the best fit value of $\sigma\mathcal{B}A$ and number of events, as a function of width for a four-jet resonance mass of 8.6 TeV with $\alpha_{\text{true}} = 0.25$. The table demonstrates that broader resonances, with widths of 5 and 10%, provide a better fit for all three observed candidate events.

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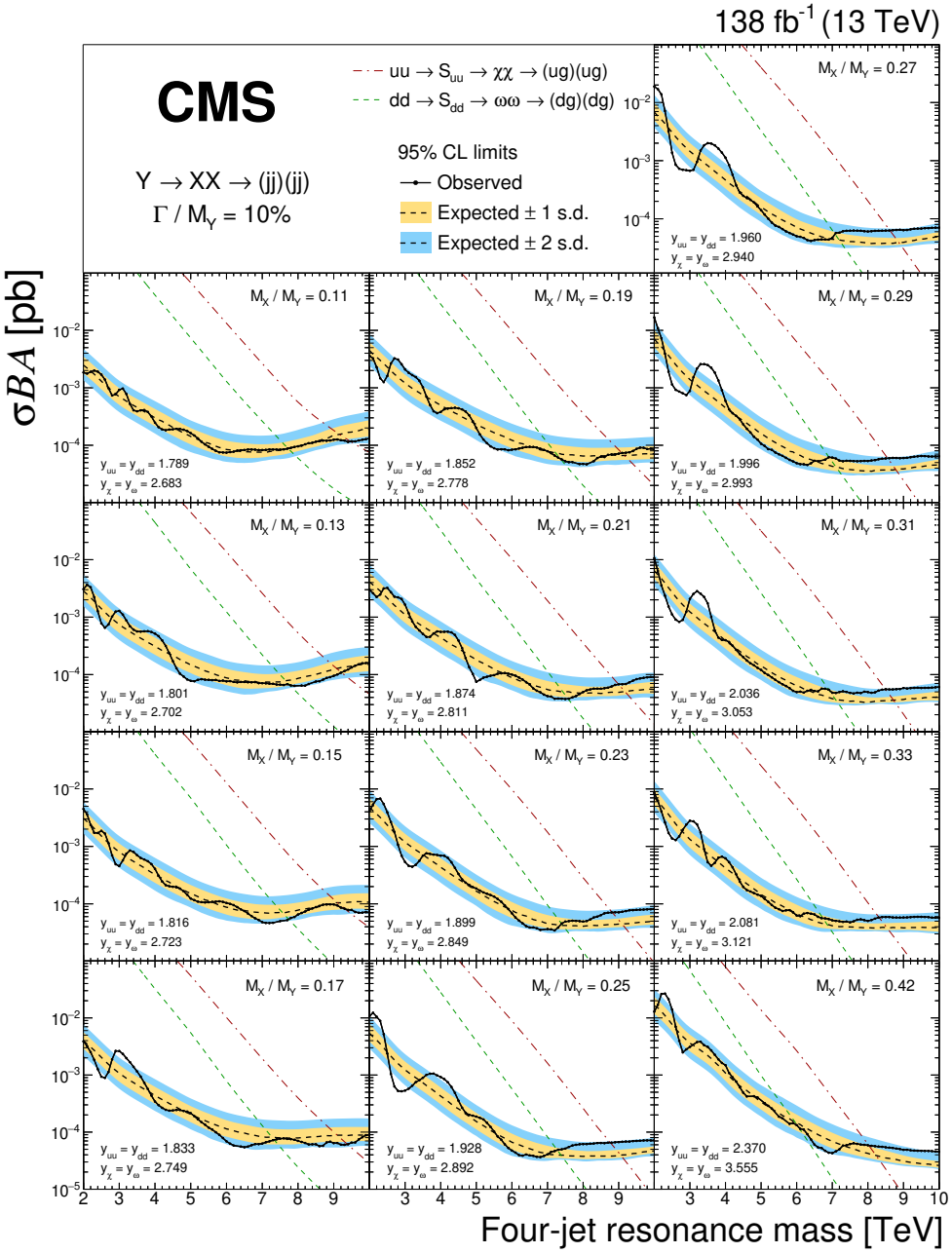


Figure 2. The observed 95% CL upper limits (points) on the product of the cross section, branching fraction, and acceptance for resonant production of paired dijet resonances, X, with width of the initial resonance Y equal to 10%, and values of $\alpha_{\text{true}} = M_{\text{X}}/M_{\text{Y}}$ shown in each panel. The corresponding expected limits (dashed) and their variations at the 1 and 2 s.d. levels (shaded bands) are also shown. Limits are compared to predictions for scalar S_{uu} (red dot-dashed lines) and S_{dd} (green dashed lines) diquarks [3] with couplings to pairs of up and down quarks, y_{uu} and y_{dd}, and to pairs of vector-like quarks, y_χ and y_ω, shown in each panel.

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Width	Observed (expected) mass limit [TeV]	
	S_{uu} scalar diquark	S_{dd} scalar diquark
$\Gamma/M_S = 1.5\%$	7.8 (8.1)	6.5 (6.3)
$\Gamma/M_S = 5\%$	8.3 (8.6)	7.0 (6.9)
$\Gamma/M_S = 10\%$	8.8 (9.1)	7.3 (7.4)

Table 1. Observed and expected mass limits at 95% CL for S_{uu} and S_{dd} diquark models with $\alpha_{true} = 0.25$.

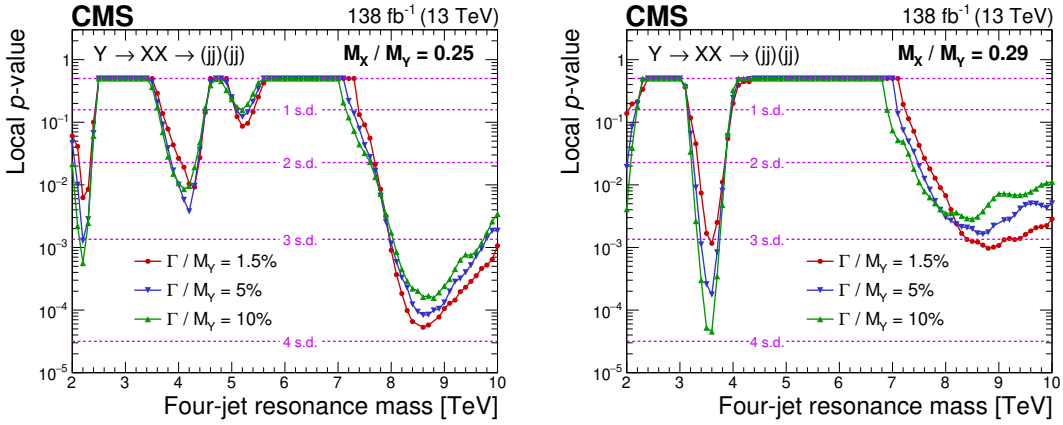


Figure 3. Observed local p-value for a four-jet resonance, Y, decaying to a pair of dijet resonances, X, with $\alpha_{true} = M_X/M_Y = 0.25$ (left) and 0.29 (right), and various widths of Y superimposed. Also shown are corresponding levels of local significance (dashed lines) in s.d.

Γ/M_Y [%]	M_Y [TeV]	M_X [TeV]	$\sigma\mathcal{B}A$ [pb]	Events	Local (global) significance [s.d.]
1.5	8.6	2.15	$1.68^{+1.50}_{-0.94} \times 10^{-5}$	$2.3^{+2.1}_{-1.3}$	3.9 (1.6)
5	"	"	$2.04^{+1.83}_{-1.15} \times 10^{-5}$	$2.8^{+2.5}_{-1.6}$	3.8 (1.5)
10	"	"	$2.22^{+1.99}_{-1.26} \times 10^{-5}$	$3.1^{+2.7}_{-1.7}$	3.6 (1.4)
1.5	3.6	1.0	$0.83^{+0.30}_{-0.32} \times 10^{-3}$	114^{+42}_{-44}	3.0 (0.5)
5	"	"	$1.18^{+0.36}_{-0.33} \times 10^{-3}$	162^{+50}_{-46}	3.6 (1.6)
10	"	"	$1.53^{+0.42}_{-0.40} \times 10^{-3}$	210^{+58}_{-54}	3.9 (2.2)

Table 2. For each resonance width and for the two most significant resonance hypotheses found, we list the Y and X resonance masses, the best fit values of signal $\sigma\mathcal{B}A$ from the signal-plus-background fit, the corresponding number of signal events, and the local and global significance.

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A second excess is observed at a four-jet resonance mass of 3.6 TeV, $\alpha_{\text{true}} = 0.29$, and 10% width with a local and global significance of 3.9 and 2.2 s.d. respectively, as shown in figure 3 (right). This excess points to a structure in data near a dijet mass of 1 TeV, which was also reported by the search for nonresonant production of pairs of dijet resonances, and is further discussed in refs. [4, 9]. Its corresponding best fit values of $\sigma\mathcal{B}A$, number of events, and signal significance are presented in table 2. Here the significance increases with width.

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Data Availability Statement. This article has no associated data or the data will not be deposited.

Code Availability Statement. This article has no associated code or the code will not be deposited.

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References

[1] CMS collaboration, *Search for high mass dijet resonances with a new background prediction method in proton-proton collisions at $\sqrt{s} = 13$ TeV*, *JHEP* **05** (2020) 033 [arXiv:1911.03947] [INSPIRE].

[2] ATLAS collaboration, *Search for new resonances in mass distributions of jet pairs using 139 fb^{-1} of pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, *JHEP* **03** (2020) 145 [arXiv:1910.08447] [INSPIRE].

[3] B.A. Dobrescu, R.M. Harris and J. Isaacson, *Ultraheavy resonances at the LHC: beyond the QCD background*, arXiv:1810.09429 [INSPIRE].

[4] B.A. Dobrescu, *TeV-scale particles and LHC events with dijet pairs*, *JHEP* **06** (2025) 113 [arXiv:2411.04121] [INSPIRE].

[5] B.A. Dobrescu, *LHC probes of the 10 TeV scale*, arXiv:1912.13155 [INSPIRE].

[6] I. Duminica et al., *Ultraheavy diquark decaying into vectorlike quarks at the LHC*, *Phys. Rev. D* **111** (2025) 115025 [arXiv:2503.17031] [INSPIRE].

[7] Y. Bai and B.A. Dobrescu, *Collider Tests of the Renormalizable Coloron Model*, *JHEP* **04** (2018) 114 [arXiv:1802.03005] [INSPIRE].

[8] P. Bittar, S. Roy and C.E.M. Wagner, *R-parity violation and 8 TeV four-jet events at the LHC*, *Phys. Rev. D* **112** (2025) 115030 [arXiv:2509.09062] [INSPIRE].

[9] A. Crivellin, C.A. Manzari, B. Mellado and S.-E. Dahbi, *Consistency and interpretation of the LHC dijet excesses*, *Phys. Rev. D* **107** (2023) 054045 [arXiv:2208.12254] [INSPIRE].

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